FLIGHT
& The AIRCRAFT ENGINEER.

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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"Newspapers are an essential part of our war organisation."
(Sir Auckland Geddes, Minister of National Service.)

The Future of Air Travel.

WHATEVER may happen immediately after the war with regard to the establishment of long-distance aeroplane and airship services, there can be no question but that we shall see a very large number of mail and passenger lines inaugurated in many parts of the world. Almost every Government, enemy as well as Allied and neutral, is laying its plans for postal services between its own principal cities and even for similar services beyond its own borders. Sir Joseph Ward, the Postmaster-General of New Zealand, told an audience the other day that he had decided to introduce aeroplanes into that Dominion to carry the mails from one end of the country to the other. Similarly the same projects are toward all over the world, and we can with certainty predict that inside the next decade—provided the war is over before then, which is quite a necessary reservation to make—we shall be living in an era of aerial communication, so far as our short distance mail services are concerned.

As our readers know, we are by no means sceptics in the matter of the future possibilities of aerial navigation. In fact, if we ever do fall into error in our estimates of that future it is in the direction of optimism. But we think it is as well that we should not be too sanguine about the rapid development of passenger services outside the State-controlled mail lines. Let us hasten to say that we entirely believe the former will come, and that reasonably quickly, but it will nevertheless take time, for the reason that there are many prejudices to be overcome and much demonstration work to be done before we can hope to see commercially paying aeroplane services established and their shareholders receiving dividends. We do not for a moment question the figures that eminent experts have given us of the costs of running such services. Mr. Handley Page said the other day that it would be possible, directly after the war, to run a service between London and Marseilles at a cost of 1.36*d.* per passenger mile. He based his calculations on the use of a medium-sized machine making non-stop flights of 400 miles. Each would be provided with 300 h.p. engines, and would carry 4,400 lb. of revenue-earning load in addition to the pilot and mechanic and the petrol necessary for a five-hour flight.

There would be first-class aerodromes at each end of the route, and another in the middle, completely equipped for overhauling and repairing machines. Second-class aerodromes, with necessary equipment, would be provided every 100 miles, these latter corresponding to the ordinary stations of a railway. He provided for 24 machines running a minimum service of six machines each way per day. Such a service could be provided for a capital of under £500,000. The annual cost would be under £600,000. The cost per ton mile would work out at 20½*d.*, and the cost per passenger mile to 1.36*d.* Merchandise would have to be carried with passengers if the passenger rate were to be kept down.

Quite so, but we really think the time has come to utter a mild word of warning in the matter of such calculations as these. Not that the figures themselves are open to question. If anyone knows what he is talking about in the matter of the costs of long-

distance flying, it is Mr. Handley Page, and we are always glad to have them. But when the end of the war is in sight we are afraid that such figures as these will be taken hold of by the financial groups which have their eyes upon the exploitation of the aerial movement, and will be used for company-promoting purposes. Now, there is always this qualification to be added to such calculations as these: - that the service will pay as anticipated if the passengers can be obtained to keep it going and if merchants and others will entrust their goods for delivery by aeroplane. They will ultimately—that is as certain as anything can be. And before long the traveller will have become so habituated to journeying through the air that he will no more hesitate to trust himself to the aeroplane than he does now to step into a train at a railway terminus. It is of no avail, however, for us to think that all there is to do is to raise the necessary capital, build the machines and immediately start upon a six machines a day service between London and Marseilles and pay a handsome dividend at the end of the first year's working. As a matter of fact, we do not read the statements of Mr. Handley Page or of others who have dealt with the same subject to mean that at all. They are, and have been, concerned with the technical possibilities rather than the concrete commercial aspects. What they tell us in effect is: If the travelling public and the commercial community will trust themselves and their merchandise to the aeroplane, the latter can carry them at rates which will compare favourably with other forms of conveyance and show a handsome profit to the undertaking. Beyond that it is the business of those who are most closely identified with the movement to carry on without ceasing the necessary propaganda for convincing those upon whom success will depend that the air is as safe a medium for transport as either land or sea. Frankly, it will need a lot of propaganda and demonstration to do that, and we shall avoid much disappointment if we look the facts squarely in the face. We shall most certainly get there in the end, but it will not be in a day, and to think so would be to delude ourselves.

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Shaking Up the Hun.

From the point of view of the Allied aerial offensive against Germany, July was certainly an excellent month. Not only were a record number of enemy machines destroyed on the various battle fronts, but our own Independent Air Force carried out no fewer than 96 separate raids into Hunland itself, upon the various raided towns of which were dropped the respectable total of 81 tons of bombs. Among the more important towns which received the attentions of our airmen were Coblentz, which was visited three times; Heidelberg; Mannheim, four times; and Stuttgart, twice. An average of a little over three raids every day into Germany is calculated to make the Hun wonder why he was so ill-advised as to commence the game of aerial frightfulness, which certainly has ceased to pay him since the Allies arrived at a state of sufficient aerial strength to have a proportion available for returning his attentions to our own towns and cities. For our own part, we were very much against reprisals until it became clear that the Hun could only be deterred from his evil ways by doses of his own frightfulness. In common with most of the British people, we had much rather that we could have conducted the war in as decent a way as war, an essentially brutal business, can be carried on, but to allow feelings of chivalry to have any play at all when we are dealing with a brutish and debased enemy like the Prussian can become puerile foolishness. And, if we are going to adopt the only really deterrent policy, we have got to carry it out properly. Half measures are of no avail. It is very satisfactory, then, to know that we are in process of rubbing in the lesson, and even more so to know that what the Rhineland towns have had in July will probably be doubled in August and quadrupled in September.

There is another very satisfactory aspect of the aerial war as it is being carried into Germany, which is that it is producing exactly the effect that was predicted for it. When the enemy began his policy of indiscriminate raids on our own open towns, he sought to justify his action by the argument that his raids produced a direct military effect, inasmuch as they compelled our military command to keep at home for purposes of defence a very large number of aircraft, numerous anti-aircraft guns and ammunition, with all the necessary *personnel*, all of which would otherwise have been available for use on the battle front. Without attempting to argue as to the morality of the contention, it may be remarked that it is pre-eminently a rule that works both ways—and that the Hun is able to appreciate by now, and will doubtless do so even better before long. From the recent experiences of our raiding squadrons it is clear that the enemy has been laid under the necessity of detaching from the front a very large number of fighting machines for the protection of his own towns. The defence, too, is absorbing very numerous guns and a corresponding *personnel*, so that apart from the destruction of German munition factories and the dislocation of communications, we can claim that our raids are producing a decided military effect—and we can refer the Hun to his own doctrine for our justification.

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Blinding the German Navy.

The destruction of two of the latest German airships of the Zeppelin type in the air is certainly another feather in the cap of the Navy and the R.A.F., and, taken with the raid on Tondern, in which two Zeppelin sheds were effectively bombed and burnt, has materially assisted to blind the eyes of the German navy. The two airships destroyed at sea are "certainties." They can be written off the strength of the enemy's air forces without any question at all. Of the Tondern affair, all we can say is that the sheds were certainly destroyed and that no airships have left or returned to that base since. We are thus justified in assuming that the total number of these giant craft destroyed during the past six weeks has been four, which is a very substantial proportion of the whole number available for the North Sea patrol. Moreover, the fact that the Navy is out looking for them and possesses all the means for their destruction when they are met with is not likely to reassure the crews of the Zeppelins that are left to carry on the work. It is a good thing that we are getting them in this way, for there is not the slightest doubt that the German airships have been able to do a great deal of very useful reconnaissance work in connection with the naval operations in the North Sea. What the German navy owes to their enormous range of vision cannot be

stated until after the end of the war, but it is a great deal.

Incidentally to the destruction of these craft, it has been stated that Captain Strasser, who was killed when "L. 70" was brought down off the coast, was before the war the captain of a German steamer trading between the Elbe and Humber, and had been employed in airships because of the local knowledge of the British coasts he had acquired in consequence. That is not so. On the contrary, he was an officer of the Imperial German Navy, which he entered as a cadet in 1894. He developed into an especially brilliant gunnery officer, and joined the airship service when the German navy first adopted that type of craft. He was made chief of the Naval Airship Service in 1913, and remained at its head until he was killed a fortnight ago.

* * *

Mr. Hughes on the Future.

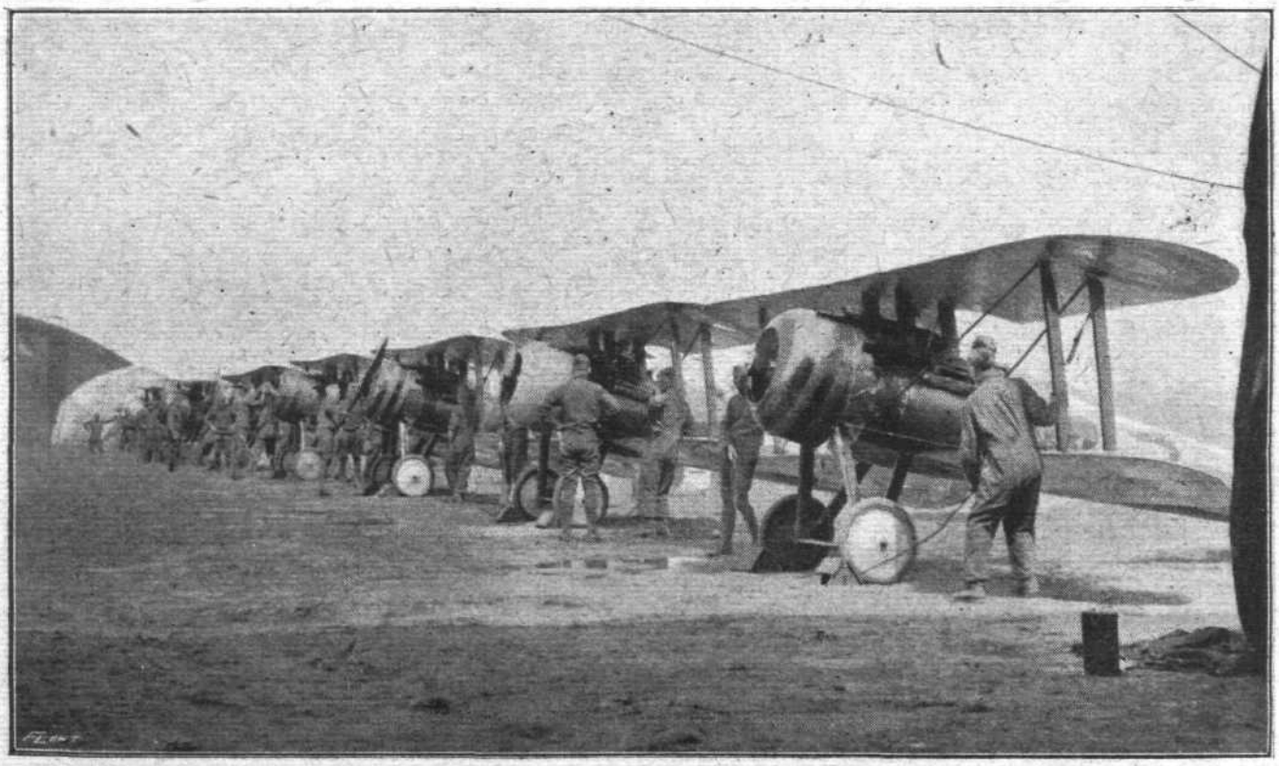
In the course of an address delivered to the members of the British Empire League last week, Mr. Hughes, the Australian Premier, was eloquent on the subject of the trade policy of the Empire after the war.

He pointed out that the question of what that policy was to be was one of vital importance, and some indication of it ought to be disclosed without delay. The future trade policy of the Empire would depend largely on that of Britain, and a radical change in the trade relations of the Empire could not be affected in a week. Of course, if Britain was going to get what she wanted from Germany, as it did before the war, the matter was very simple. But if not, then the producers of Britain and the Empire ought to be told what the trade policy of Britain was going to be, so that arrangements could be made accordingly. The policy of *laissez faire* to which Britain clung before the war disregarded entirely the fundamental fact that an economic policy which took no heed of national safety must inevitably undermine the nation's greatness.

By the policy of *laissez faire* we had left our citadels open to the enemy, given him the keys of national and economic life, and had almost been lured to our destruction. The thing that mattered above all other material things to the people of Britain, of the Empire, and of our Allies, was that they should be, and should remain, economically independent of Germany after the war; that the conditions precedent to and necessary to abundant and regular employment at good wages and in decent working conditions should exist; and that our soldiers coming back should find a place prepared for them worthy of their heroism, their endurance and their sacrifice.

There are many, however, who seem to forget that it is not only Britain that is at war, but the Empire. These seemed also to forget that although the Dominions were not consulted as to the declaration of war, yet, now they were in it, they had as much right to be consulted as to the conduct of the war, the terms of peace, and all other matters relating to the war as Britain herself or any of her Allies. Nor did they seem to understand that this war was a war between nations, that it vitally concerned every phase of our national and individual lives, that its effects upon industry and commerce were tremendous, that these effects would not pass when war ceased, but would profoundly modify the economic outlook of the world.

Speaking of the measures that would be necessary to secure our economic independence of Germany, Mr. Hughes went on to say that what he wanted was a policy that would ensure to Britain and her Allies an adequate supply of raw materials that would encourage the production of such raw materials as the Empire produced, or could produce, would prevent this or any other market within the Empire being the dumping ground of German goods, and



WITH THE U.S. ARMY.—Waiting for an "Alert."

would enable the Empire to hold its own in the home and foreign markets. If, he said, his friends to whom a tariff was anathema could formulate such a policy, why did they not do so? Why did they range themselves alongside the Germans in our midst and support the very policy that Germany desires we should?

Obviously, a journal such as "FLIGHT" cannot enter into a discussion of the relative merits of Free Trade and Tariffs, and it is not at all our intention to do anything of the sort.

But it seems to us that Mr. Hughes is most absolutely right when he says that the war has profoundly altered all the old land-marks, and that it is quite impossible to discuss this question from the old points of view. The great, in fact the only issue before the nation in this matter of trade policy after the war is as he has set forth, and it is one that must be approached with an absolutely open mind from which all the old shibboleths have been dismissed. Mr. Hughes himself put the matter very well when he said that he did not pin his faith to tariffs, but to organisation. In other words, to the adoption by each industry of such methods as would equip it most effectively for the trade war after the war. But in cases where the remedy called for was clearly a tariff or a bonus, were we to hesitate to adopt it because in 1849 somebody said or did something, or because such action would annoy Gemany?

It seems to us that there can only be a single answer to such a question. However, the point that has to be considered now is that of the clear enunciation of our future trade policy. We have a Ministry of Reconstruction, with a real Minister and a large staff which purports to be very busy with the problems of industrial and commercial reconstruction, but the most important of these problems—policy—has not been touched so far as anybody outside the charmed circle can know. And until we do know it seems to us that it is quite impossible for our industrial and commercial community to lay any concrete plans for the future. Unfortunately, we do not seem to have abandoned *laissez faire* even yet. The Government peddles with decorations and votes for women, education, and other matters, some of which are important and others utterly beside the issue, but the most important of all is left to the future to look after. Agreed that the problem is a terribly difficult one, it has to be tackled some time, and the earlier the better. Let us get on to it now, and know where we stand without delay. Once we know that, a great deal of the work of reconstruction will take care of itself. The aircraft industry is vastly interested in the well-being of the future.

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The King's Letter.

IN the letter dated France, August 13th, sent by the King to Field-Marshal Sir Douglas Haig, at the conclusion of His Majesty's visit to the Front, there is the following reference to the work of the R.A.F.. "I have inspected detachments of the Royal Air Force. Its prowess and established superiority over the enemy make me proud to be the General-in-Chief of this last creation in the fighting forces of the world."

The Air Force Reserve.

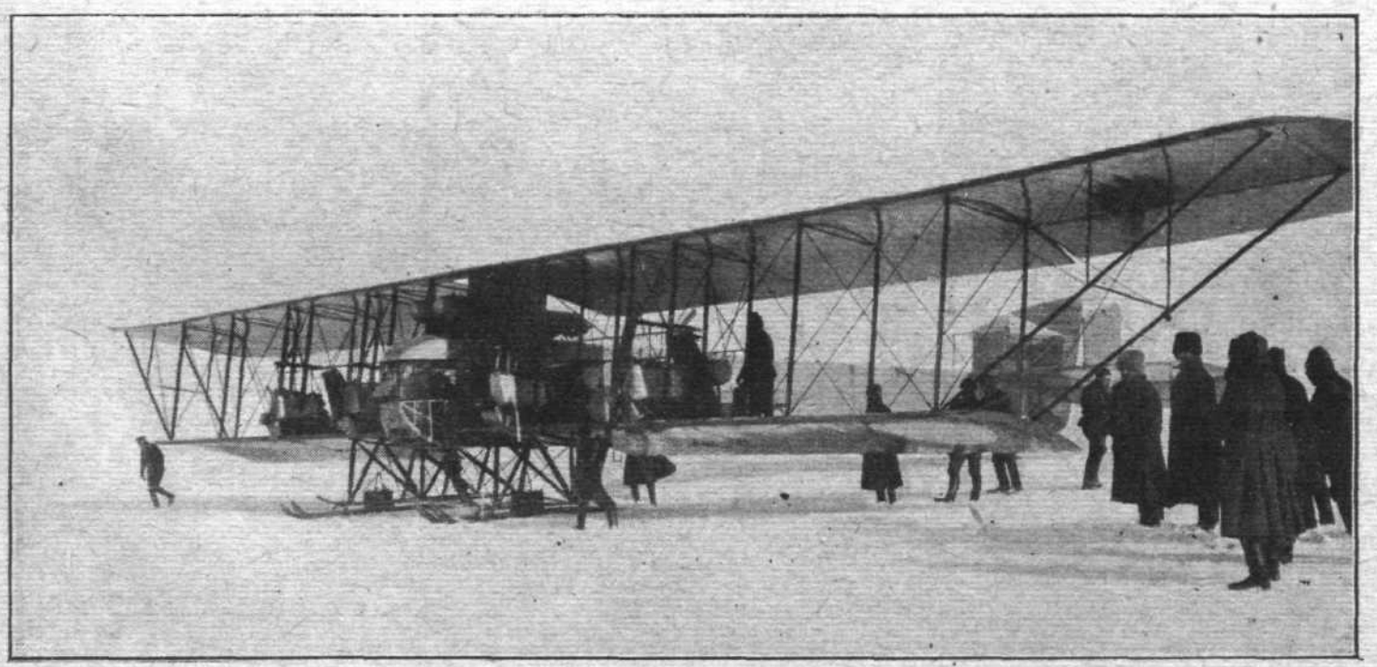
AN Order in Council published in the *London Gazette* of August 20th sets forth that certain enactments relating to the Army Reserve shall apply in relation to the Air Force Reserve, subject to certain adaptions set forth, which mainly consist of the substitution of Air Force titles and references in place of those referring to the Army, In this connection, it states that the references to "soldier" in the Reserve Forces Act, 1899, shall be construed as including references "to an airman of the regular Air Force and to the Air Force Reserve."

What Canada is Producing.

A STATEMENT issued by the Canadian Imperial Munitions Board announces that under its direction Canada has produced 2,000 aeroplanes since the manufacture of them was started. The present output is said to be equal to 350 machines per month.

Enemy Using Parachutes.

ALTHOUGH it has been evident for some time past that some of the German machines have had parachutes fitted to them, it is only recently that it has been noticed that pilots have made use of them. The *Times* correspondent at the Front, writing on August 18th, reports that the pilots of two Fokker biplanes which were shot down were pulled clear of the falling machines by parachutes. Apparently they are made of white silk and slightly smaller than a balloon parachute. In one case the parachute did not act until the machine had fallen at least 2,000 ft.



A Sikorsky biplane fitted with snow skids for winter flying.

FLIGHT

THINKING AERONAUTICALLY.

By AIR-MECHANIC.

THE British subject who would think largely must to-day think aeronautically.

The islander could once make out an excellent case for resting his whole confidence upon sea waters. To-day the aeroplane has given us a new orientation: the orientation of the air; and for Britons, more perhaps than for other peoples, it is vitally important to grasp quickly and sanely the significance of the new orientation. To the Royal Navy seaplane and airship are as essential auxiliaries as are the aeroplane and the observation balloon to the British Army. They are the eyes of the Navy as they are of the batteries in France. They are eagles dowered by wireless.

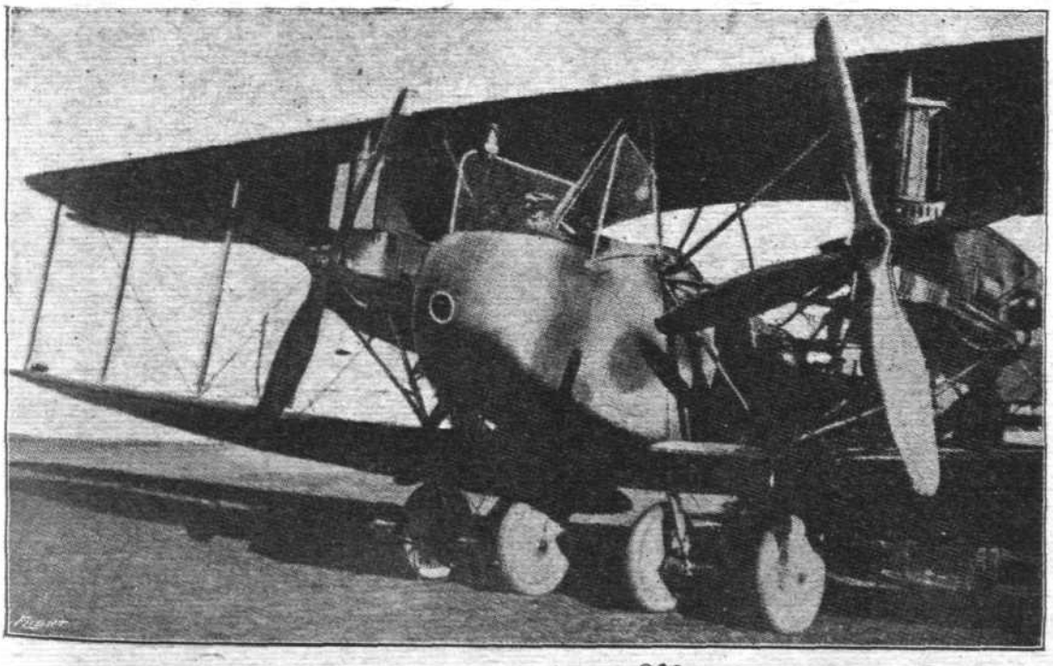
But to think aeronautically includes more than the war uses of aviation. It includes the new fact of the freedom of the air.

The Royal Air Force to-day exists by virtue of that fact. Yet powerful though it be, the R.A.F. is still but a Gargantuan war-baby which will only reach its full estate with the coming of peace. Things now hidden by the fog of war will be revealed to us, and the significance of the R.A.F. and its vital importance to the British will be made plain. A novelist once imagined "The Food of the Gods." On some such food is the R.A.F. in course of being reared to-day. War is its nursery, but peace its career, and it is no exaggeration to say that on that career depends much in the future of the Empire. For note, flight, once a dream, is so true as to be a platitude. And platitudes, backed by imagination, build empires. In this case the imagination was the prevision of the Government which, recognising the obvious fact that "flight was true," rose to meet the new situation by the establishment of the R.A.F. It was one of the gestures which makes history. It was the announcement that aviation belonged neither to the Army nor the Navy, but to the nation. It was the proof that the British Government could look beyond the pressing needs of war, and while supplying them, could lay a sure foundation for Great Britain's air future. It was thinking aeronautically which includes something larger than war—it includes peace flying, safe, unexciting, usual as motoring.

When war passes, the energies of men and the material of aviation will be devoted automatically to the development of peace flying, and then the R.A.F. will give us not only the air navy of the future and the policing of the skies, but the air mercantile marine.

The British Empire is scattered, the German Empire is concentrated. That concentration is a source of strength to Germany, whereas the dissipation of the British Empire is a source of weakness which in the nature of the case can only be partially counterbalanced by a navy even when supreme. The British Navy demobilises German shipping, naval and mercantile. But it cannot annihilate distance. Neither can the aeroplane do more than partially counterbalance; but it almost annihilates distance. London to Cape Town, a sea-voyage of three weeks, will be flown in three days. That is not to say that the slow, heavily-laden cargo steamer will be a thing of the past or that holders of shipping shares should take their profits and write off the future. It is merely the statement of an enormously significant fact. The aeroplane will draw together the Empire. It will bring London as near to Cape Town as London was to Newcastle in the coaching days, and its carrying capacity for long distance flights will more than equal that of the old mail-coach.

The restraint of that statement, with its suggestion that air-transport is to-day not further developed than was rapid land-transport in the time of the mail-coach, may annoy the enthusiast, but in this matter it is better to understate than to prophesy, and the need for an Imperial Air Service is self-evident while the Empire without an Air Service would be self-condemned. The average mind, when considering the question of flight, is apt to be rhapsodic and vague. The need is for opinion which thinks aeronautically, and whose criticism is informed and constructive. The new fact is hardly digested yet, the implications of the R.A.F. are hardly realised. The Empire was won by land and sea. Will it be held by air? Will the transport trade now hitch its wagon to a star? What are the things made obsolete by flight? Which go, which remain? Has geography to go? Does distance count? These questions can be answered only by cool, steady thinking in terms of aeronautics.



A German Twin-engined Bomber.—It will be seen that at last the enemy has apparently been obliged to employ four-bladed air-screws. Hitherto there has been a marked tendency on the part of German constructors to stick to the two-bladed propeller. Also note in place the wire guards protecting against the propeller tips.

THE PFALZ SINGLE-SEATER FIGHTER.

160 H.P. MERCEDES ENGINE.

(*Concluded from page 908.*)

THE top plane of the Pfalz is supported from the body by two inverted, flattened U's, as mentioned in our last issue. The attachment of these U's to the body was shown in Fig. 17. The attachment to the top plane is of a similar character, as shown in Fig. 21. The upper corner of the centre-section struts is provided with a sheet steel shoe to which is welded a socket or cup. A bolt passing vertically through the spar terminates in a ball-shaped head, which fits into the cup, and a taper pin passing through ball and socket locks the joint. to the spar by a very simple fitting, shown inset in Fig. 21. A small steel plate is stamped out to form a shallow projection, the diameter of which corresponds to the internal diameter of the compression tube, which is thus prevented from slipping on the spar. This sheet steel plate is secured to the spars by two horizontal bolts, and its ends are shaped to form the lugs for the attachment of the drift or anti-drift wires, as the case may be. The drift wires of the Pfalz are in reality tie rods of circular section, threaded at their ends to fit directly into the

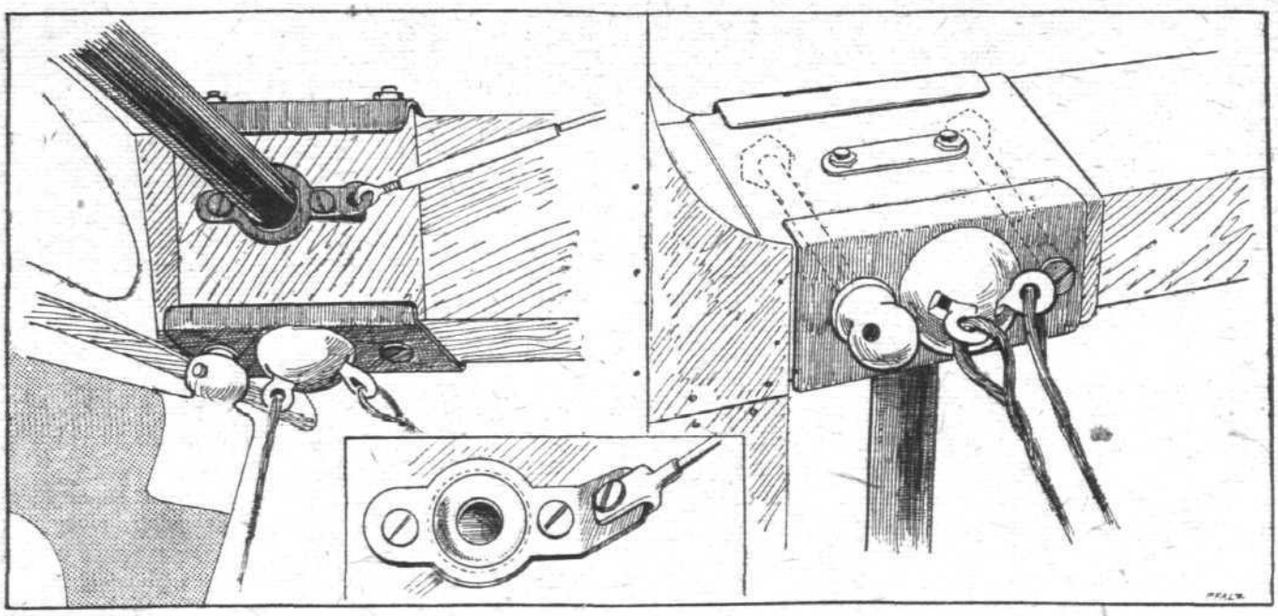


Fig. 21.—Attachment of centre-section struts to top plane of the Pfalz. On the right the fitting is shown from a different point of view. The inset shows the wiring lug plate, which also serves as a guide for the end of the compression tube.

The inter-plane cables are attached to little anchor pieces shaped as shown in the sketch, terminating inside the larger cup in a wide head shaped to fit the internal curve of the cup. A certain amount of play is therefore allowed. The right hand sketch in Fig. 21 shows, from a different point of view, the corresponding fitting on the rear spar.

The internal compression tubes of the wings are secured barrel of the turnbuckles. The anti-drift wires are solid wires of about 12 gauge size.

The inter-plane struts of the Pfalz are, as mentioned in our last issue, approximately of Vee form, although they do not quite come to a point at their lower ends. In section they are, needless to say, stream-line, and constructionally they are built up of various laminations, as shown in one of the small

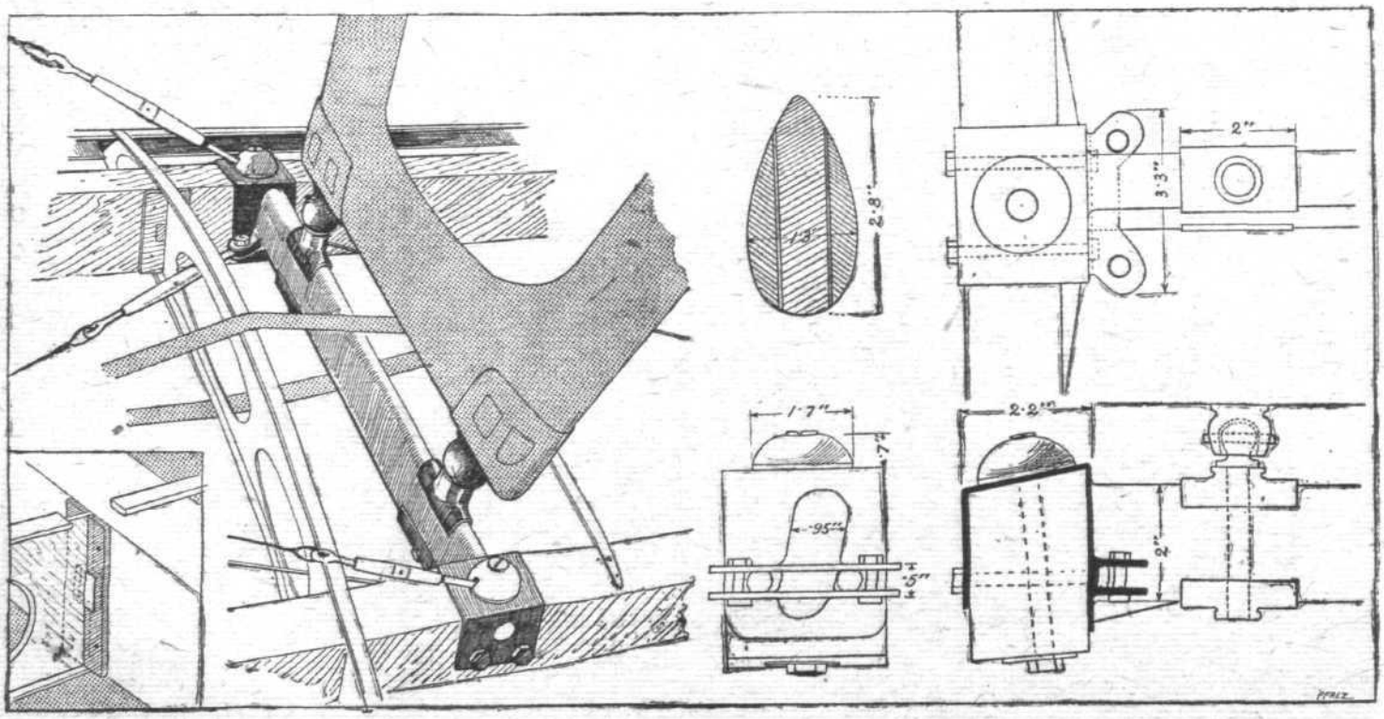


Fig. 22.—Details of the attachment of inter-plane struts to lower plane of the Pfalz single-seater. The smaller insets show a section of the inter-plane struts and—in the left-hand corner—the attachment of the wing ribs to the spars. The top flange is shown cut through so as to show the details below.

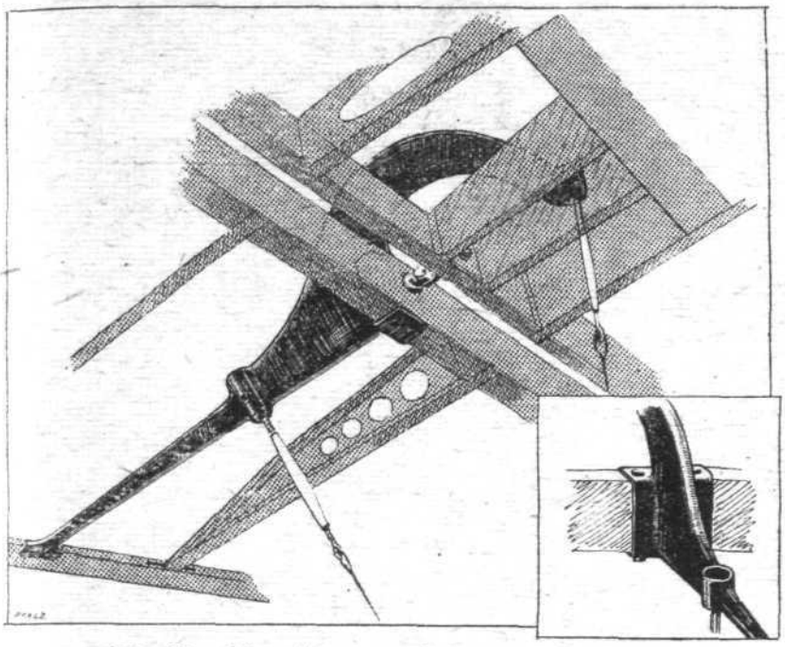


Fig. 23.—The *aileron* crank lever of the Pfalz.

insets of Fig. 22. The two outer layers are spruce. Then come, one on each side, two layers of thin three-ply, while the centre of the strut is formed by a piece of spruce. The whole is then covered with fabric. The same construction is employed for the centre-section struts. The angle formed by the vertical and horizontal arms of these struts is elaborately built up of laminations, the grains of which cross one another at various angles. The strength appears good, but the struts are certainly not light, compared with the ordinary hollow or even solid spruce strut.

The attachment of the inter-plane struts to the bottom plane is interesting. As the horizontal arm of the struts is shorter than the distance between the spars of the bottom plane the struts cannot be attached directly to the spars. Instead they are attached, by means of the usual Pfalz ball-and-socket joint, to a compression tube. Owing to the fact that this tube is subject to a lateral load, being loaded both as a strut and as a beam, the usual compression tube attachment already referred to would be inadequate. Instead the arrangement illustrated in Fig. 22 is employed. The compression tube is unlike those employed elsewhere in the planes, inasmuch as it is not of circular section, but is flattened so as to have flat parallel sides and a top and bottom forming arcs of a circle. At its ends this tube is welded to a base plate of channel section, which partly surrounds the three sides of the wing spar. Before being welded to its end plates the tube is slotted at its ends to accommo-

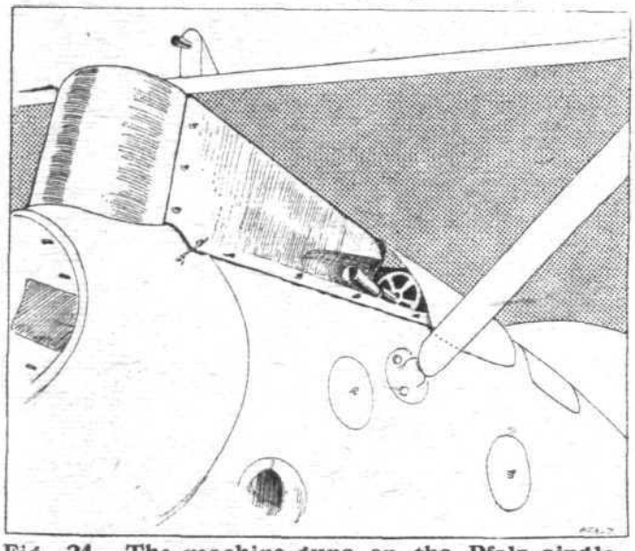


Fig. 24.—The machine-guns on the Pfalz single-seater are totally enlosed, with the exception of the muzzle. Note the scoop in the engine housing.

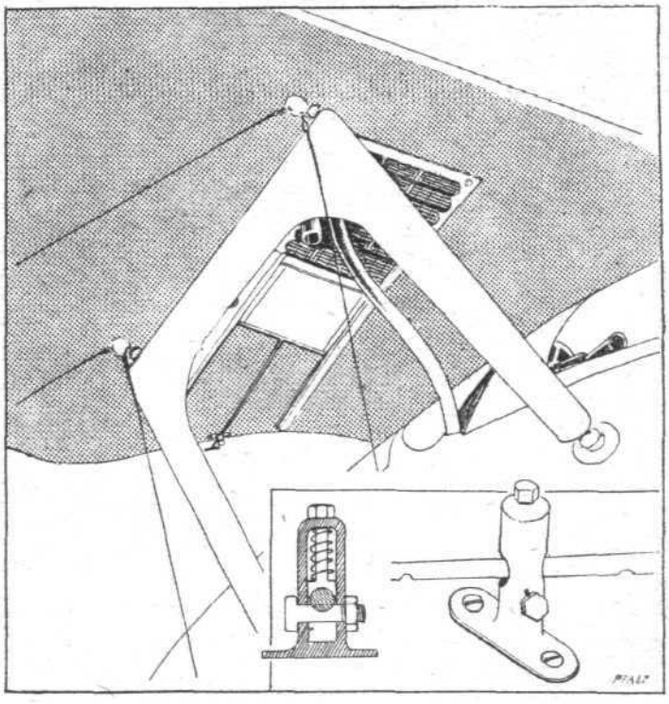


Fig. 26.—The radiator of the Pfalz is mounted in the top plane, and the cooling is varied by means of a shutter. The details of the locking device which enables the shutter to be left in any desired position are shown in the inset.

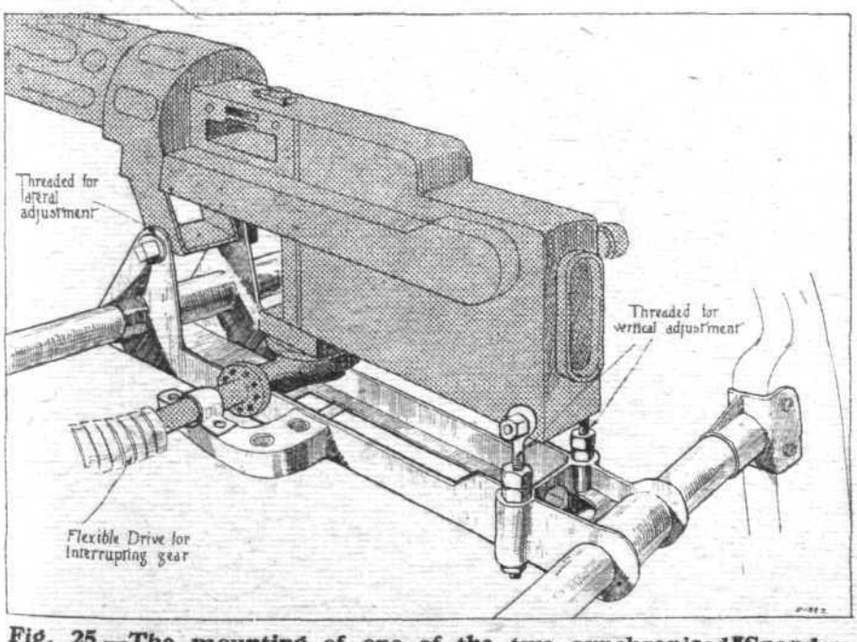


Fig. 25.—The mounting of one of the two synchronised Spandau machine-guns which constitute the armament of the Pfalz.

date the lugs for the drift and anti-drift wires. These lugs are formed by bending a piece of sheet steel to a channel section, the bottom of the channel being welded to the base plate and the arms welded to the compression tube. The horizontal bolts securing the base plates to the wing spar have their heads filed flat so as to pass between the two drift wire lugs, and are thus at the same time prevented from turning when tightening up the nuts on the other side of the spar. The details of this part of the wing structure will be clear from Fig. 22.

The general arrangement and spacing of the wing ribs of the Pfalz were shown in Fig. 19 of our last issue. Constructionally the ribs are built up in the usual way of three-ply webs and spruce flanges. False ribs occur between the main ribs, running over the top of the spars, from leading edge to rear spar. These false ribs are made of ash. In con-

nection with the main ribs mention may be made of a rather neat little "dodge" for attaching the ribs in place on the spars. As usual the rib flanges are tacked to the top and bottom faces of the spars. In addition the ribs are prevented from sliding along the spars by two vertical pieces of wood, each tacked to the spar. In the middle these vertical pieces are slotted to accommodate a small square block of wood about ½ inch square—which is glued to the face of the spar. The end of the rib web is recessed to give room for this block, the effect of which is, it will be seen, to relieve to a certain extent the shearing stress on the rib flanges at the corners of the spar. It is only a small detail we admit, but it is, we think worthy of mention, and has been included in Fig. 22.

The crank lever of the *ailerons* is shown in Fig. 23. As in all German machines, *ailerons* are fitted to the top plane only, and their crank levers are horizontal, working in slots in the plane. The *aileron* hinges on a false spar. The crank levers are built up of two halves of sheet steel, pressed to form in section one half of an ellipse. The two halves are then welded together along the edges. The control cables are secured to the crank lever by the same ball-and-socket attachment as that employed for the rudder and elevator controls already described. The cables pass from the lever, around pulleys in the bottom wing, and through tubes to the controls. These tubes appear to be made of some sort of paper or cardboard, although whether made by wrapping the paper spirally or rolled up straight to form a tube we have not been able to ascertain.

Reference has already been made to the fact that the radiator of the Pfalz is mounted in the top plane. The cooling may be varied by an adjustable shutter which has a handle projecting back so as to be within the reach of the pilot. The arrangement of this shutter is shown in Fig. 26. The rod carrying the handle has a series of notches cut in it so as to form suitable stops for the shutter in any desired position. The details of the locking device will be evident from an inspection of Fig. 26.

The armament of the Pfalz consists of two synchronised machine guns of the Spandau type. The mounting of these is shown in Fig. 25. Two transverse tubes form the supports for the gun mounting, which appears very light, being made of light gauge steel suitably reinforced by webs in places. The rear attachment of the gun provides for vertical adjustment, while the front attachment enables a slight lateral alignment of the gun after the mounting has been bolted into place on the cross tubes. A peculiarity of the gun placing on this particular Pfalz is that the guns are entirely enclosed under the top covering of the body, with only the muzzle projecting. This is indicated in Fig. 24. On a later specimen of the Pfalz fighter the more usual placing of the guns above the body has been employed, whether because enclosing the guns was found unsatisfactory or not we are not in a position to say. Probably the enclosed guns were found to have a tendency to overheat.

In the Pfalz under review no attempt appears to have been made to *camouflage* the machine, which is painted with aluminium paint all over its body and wings. The rudder tail plane and elevator are painted a dark yellow.

THE ROLL OF HONOUR

(Where an Officer is seconded from the Army, his unit is shown in brackets.)

Published August 14th.

Killed.

Ashton, Sec. Lieut. G. G. (W. Riding).
Coleridge, Lieut. C. G.
Dunbar, Sec. Lieut. J. D.
Jupp, Sec. Lieut. L. B.
Meff, Sec. Lieut. W.
Morrison, Sec. Lieut. J. L.
Naish, Lieut. J. P.
Raymond, Sec. Lieut. G. V.

Wounded.

de Brisay, Sec. Lieut. F. E.
Gledhill, Lieut. A. D. (Suff. Yeo.).
Hayes, Lieut. E. G.
Ingham, P./F./O. L. H. K.
Johnson, Sec. Lieut. B.
Martin, Lieut. G.

Missing.

Ashton, Sec. Lieut. K. H.
Batty, Sec. Lieut. H. W.
Benjamin, Lieut. A. L. (R. Fus.).
Black, Lieut. S. McB.
Dennis, Sec. Lieut. L. R.
Farrall, Sec. Lieut. J. G. M.
Garrity, Lieut. W. J.
Melville, Lieut. H. T. (Sea. Highrs.).
Papenfus, Lieut. M. T. S., "D.F.C."
Richie, Sec. Lieut. T. M.
Singleton, Sec. Lieut. E.
Smith, Sec. Lieut. F. (K.O.Y.L.I.).
Stagg, Sec. Lieut. L. W. G.
Stephenson, Sec. Lieut. G. H.
Woolley, Sec. Lieut. F. W.

Published August 15th.

Killed.

Boyt, Sec. Lieut. H. G. R.
Carruthers, Sec. Lieut. G. K.
Cartwright, Lieut. J. H.
Gordon, Lieut. E. (E. Ont.).
Gorman, Sec. Lieut. R. E.
McSweeny, Sec. Lieut. G. B.
Robinson, Sec. Lieut. C. E.
Taylor, Sec. Lieut. J. (Ches. R.).

Previously Missing, now reported by German Government Killed or Died of Wounds.

Eaton, Lieut. E. C. (Sask. R.).
Hall, Lieut. R. McK. (Que. R.).
Kelly, Lieut. E. T. S. (E. Ont.).

Wounded.

Atkinson, Sec. Lieut. J.
Avery, Lieut. G. W. P.
Bailey, Sec. Lieut. T.
Bishop, Sec. Lieut. A. J.
Brereton, Lieut. L. R.
Evans, Sec. Lieut. P.
Fraser, P./F./O. D. S.
La Cecilia, Sec. Lieut. G. R.
Lecomber, Lieut. G. W. (R. Welsh F.) (T.).
Leake, Capt. E. G., M.C. (Manch.).
Macdonald, Capt. C. B. R. (R.E.).
Pain, Sec. Lieut. C. H. S.
Pithey, Lieut. C. R., D.F.C.
Ralston, Capt. J. S., M.C. (Sco. R.).
Rekofski, Lieut. S. T.
Ridley, Sec. Lieut. H.
Round, Sec. Lieut. J. Y.
Taylor, Lieut. G. E. (Durh. L.I.).

Missing.

Blake, Sec. Lieut. A. G. S.
Bragg, Lieut. E. L.
Brown, Lieut. C. F.
Bullen, Lieut. E. H.
Burge, Capt. P. S., M.C.
Carveth, Lieut. W. A.
Doidge, Lieut. E. L. (Manit.).
Gilmour, Lieut. L. C. (Sask.).
Feurer, Sec. Lieut. S. M. (R. Berks.).
Freeman, Maj. R. H., M.C.
Hall, Lieut. H. G.
Lewis, Lieut. A.
Lindner, Lieut. P. E.
Mellings, Capt. H. T.
Penrose-Welsted, Capt. S. R. (R. Ir. Regt.).

Published August 16th.

Killed.

Alder, Sec. Lieut. T. G. E. (E. Lancs.).
Bellamy, Lieut. H. E.
Cairns, Sec. Lieut. A. F.
Evans, Sec. Lieut. D. R.
Freeman, Sec. Lieut. J. A.
Sparks, Col. R. H. A.
Telfer, Sec. Lieut. W. H.

Wounded.

Fitzsimmons, Sec. Lieut. H. H.
Gleave, Sec. Lieut. J. C.
Goulding, Lieut. H. J.
Hallgren, Sec. Lieut. W. A.
Hartley, Sec. Lieut. P. S.
Heaton, Lieut. W. R.
Jones-Evans, Lieut. G. S.
King, Sec. Lieut. F. E.
Maggs, Sec. Lieut. F. G. C.
Marshall, Lieut. C. B. (North'd. F.).
Nixon, Sec. Lieut. K. (W. Riding).
Parry, Capt. C.
Pickin, Lieut. A.
Porter, Lieut. A. L.
Rogers, Sec. Lieut. R. C.
Thompson, Lieut. R. B.
White, Sec. Lieut. C. H.

Missing.

Fernald, Lieut. Van D. (R.W. Surr. R.).
Fisher, Sec. Lieut. B.
Gondre, Sec. Lieut. J.
Heron, Sec. Lieut. F. T.
Kidder, Lieut. W. T. G.
Laratt, Sec. Lieut. W. H. E. (W. Yorks.).
MacVicker, Lieut. J. E. C.
Mannock, Maj. E., D.S.O., M.C. (R.E.).
Roy, Lieut. I. L.
Rudge, Lieut. A. E.
Shearer, Sec. Lieut. F. J.
Siddall, Lieut J. H.
Sommerfelt, Sec. Lieut. A.
Steckley, Sec. Lieut. H. B. (Lond. T.F.).
Tussaud, Lieut. H. C.
Waddy, Sec. Lieut. S. N.

Published August 17th.

Previously Missing, now reported Killed.

Griggs, Lieut. A. (Aus. F.C.).

Wounded.

Tayler, Capt. C. H. (I.A.R.O.).

Missing.

McCullock, Sec. Lieut. A. F. G. (Aus. F.C.).

Previously Missing, now reported Prisoner in German hands.

Nelson, Lieut. R. C. (Aus. F. C.).

Prisoner in Turkish hands.

Welman, Sec. Lieut. J. B. (R.F.C.).

Published August 19th.

Killed.

Barron, Sec. Lieut. L.
Bayetto, Capt. T. P. H.
Brisley, Maj. C. E.
Davidson, Lieut. R. J.
Easton, Sec. Lieut. P. R.
Forrest, Sec. Lieut. A. C.
Hawkins, Sec. Lieut. R.
Jordan, Lieut. C. H.
Kelly, Sec. Lieut. J.
King, Lieut. K. V.
Lugard, Capt. E. (King's Own)
Roberts, Sec. Lieut. S. T. C.
Thomas, Capt. O. V.
Turner, Capt. R.

Wounded.

Boyce, Lieut. J. M.
Cardwell, Sec. Lieut. F.
Cooper, Lieut. M. L.
Crump, Sec. Lieut. F. F.
Davis, Lieut. A. J.
Driscoll, Lieut. D. O'Neil (Midd'x.).
Duncan, Lieut. A. T. (Gord. H.).
Ellis, Sec. Lieut. H.
Ellis, Sec. Lieut. R. W. (North'd. F.)
Gale, Capt. D. (Lancs. F.).
Grant, Capt. R. H.
Heanley, Sec. Lieut. W. E. G.
Latham, Sec. Lieut. W. G.
Mackintosh, P.F.O. F. H.
Moore, Sec. Lieut. J. (Northn. R.).
McCloughry, Capt. E. J., D.F.C. (Aus. F.C.).
Partridge, Sec. Lieut. J. W.
Rowlands, Lieut. E.
Rubinovitch, Sec. Lieut. I. J.
Ryan, Lieut. A. E.
St. Clair-Morford, Capt. A. C., M.C. (R.M.).
Salter, Sec. Lieut. E. R.
Saunders, Sec. Lieut. W. H.
Smith, Sec. Lieut. W. W. (Gord. H.).
Sutcliffe, Lieut. E. I.
Walker, Sec. Lieut. J. M.
Wiltshire, Sec. Lieut. A. T.

Missing.

Armstrong, Sec. Lieut. W. A.
Barlow, Capt. R. T.
Clarke, Sec. Lieut. J. K. (Conn. Rs.).
Coghill, Lieut. F. S.
Coulson, Sec. Lieut. W. E.
Farquhar, Lieut. J.
Gow, Lieut. J. E.
Henderson, Sec. Lieut. W. R.
Hollingsworth, Lieut. R. L.
Houston, Lieut. C. T.
Irwin, Lieut. R. V.
Laurie, Sec. Lieut. K. S.
McElroy, Capt. G. E. H., M.C., D.F.C.
Scott, Sec. Lieut. H. G. (Oxf. and B. L.I.).
Parsons, Sec. Lieut. L. H.
Pettit, Capt. S. L. (R. Fus.).
Stent, Sec. Lieut. H. R. (W. Rid.).
Stephenson, Lieut. W. S., M.C.
Struben, Lieut. H. M.
Symons, Lieut. K. W. A.
Travers, Sec. Lieut. G.
Vorster, Sec. Lieut. W. L.
Watkins, Sec. Lieut. W. (Welsh R.).
Williams, Lieut. G. J. (Hereford R.).
Wilson, Sec. Lieut. N.

Prisoner of War in Germany.

Fellowes, Lieut.-Com. P. F. M., D.S.O. (R.N.).

Published August 20th.

Killed.

Bell, Sec. Lieut. L.
Cross, Sec. Lieut. A. M.
Dulin, Lieut. W. W. M.
Lipsett, Lieut. G. A.
Ogilvy, Sec. Lieut. D. P.
Todd, Sec. Lieut. J.

FLIGHT

HONOURS

Honour for General Groves.

IT was announced on August 16th that the King had been graciously pleased to give orders for the appointment of Lieut.-Col. (Temp. Brig.-Gen.) Robert Marsland Groves, D.S.O., A.F.C., R.A.F., to be an Additional Member of the Military Division of the Third Class, or Companions, of the Order of the Bath, in recognition of distinguished services rendered during the war.

Details of Gallant Deeds.

WITH reference to the awards conferred as announced on March 4th, 1918, the following statements of service for which the decorations were conferred were published in the *London Gazette* on August 16th:—

Distinguished Service Order.

T. Sec. Lieut. (T. Capt.) B. E. BAKER, M.C., Gen. List. and R.F.C.—While on patrol he engaged nine Albatros scouts, five of these being driven down, two of which he accounted for. On another occasion, whilst leading his flight on an offensive patrol, he dived alone on a formation of six enemy scouts, driving one down out of control. During the course of his patrol work he has brought down ten enemy machines, and his work on all occasions has been magnificent. He is a dashing patrol leader, and inspires all with the greatest keeness.

T. Capt. M. B. FREW, M.C., Gen. List and R.F.C.—On one occasion when leader of a patrol he shot down an enemy aeroplane, two others being also accounted for in the same fight. On a later occasion he destroyed three enemy machines in one combat, all of which were seen to crash to the ground. Immediately after this combat he had to switch off his engine and make an attempt to glide towards our lines five miles away on account of his machine having received a direct hit. Owing to the great skill and courage he displayed in the handling of his damaged machine, he succeeded in bringing it safely to our lines. He has destroyed 22 enemy machines up to date.

T. Capt. A. H. PECK, M.C. (Gen. List and R.F.C.).—During two months' aerial fighting he has never hesitated to attack the enemy when they were in superior numbers. On one occasion, when piloting a scout, he engaged a hostile formation consisting of four scouts and two two-seaters, completely dispersing them and driving one down out of control. His dash, resourcefulness and skill have been most marked.

The Military Cross.

Lieut. (T. Capt.) D. C. BELL, Midd'x. R. and R.F.C.—When on observation duty, together with another officer, in a balloon, which was set on fire by an enemy machine, he remained in the burning balloon endeavouring at very great risk to himself to get his companion, who had been rendered insensible to a bullet wound in the head, overboard in his parachute. Being unable to do this, he was compelled to abandon his companion, whose death was subsequently found to have been due to the bullet wound, and to jump from the burning balloon.

Sec. Lieut. R. J. BROWNELL, M.M., R.F.C., Spec. Res.—Within the last three months he has brought down six enemy aeroplanes, four of which were seen to come down in flames, the other two falling completely out of control. The dash, gallantry and offensive spirit displayed on all occasions by this officer are worthy of the highest praise.

T. Sec. Lieut. P. CARPENTER, Gen. List and R.F.C.—Within a period of the last three months he has brought down six enemy machines, four of which were observed to crash to the ground, the remaining two being shot down completely out of control. The offensive tactics pursued by this daring and skilful officer have produced most successful results.

Sec. Lieut. (T. Capt.) M. E. GONNE, R. Fus. and R.F.C.—He is a daring and skilful leader of patrols, and has led his flight throughout a large amount of fighting, often against superior numbers, far over the enemy's lines. He has destroyed five enemy machines.

T. Sec. Lieut. F. C. GORRINGE, Gen. List and R.F.C.—He has destroyed several enemy machines, and has shot down others out of control. On several occasions also he has forced enemy aeroplanes to land, and has shown fine qualities of leadership and a keen offensive spirit.

Sec. Lieut. J. S. GREEN, Gen. List and R.F.C.—He has proved himself to be a skilful artillery pilot, and has frequently carried out observation a long distance over the enemy's lines under heavy anti-aircraft fire. On one occasion he drove down an enemy two-seater machine and forced it to land in our lines. He has set a splendid example to his squadron.

T. Sec. Lieut. F. HOBSON, Gen. List and R.F.C.—He has destroyed several enemy aeroplanes and driven others down out of control. On one occasion he descended to a height of 100 feet, and attacked a party of the enemy with his machine gun, inflicting several casualties on them. He has shown splendid resource and determination on all occasions.

T. Sec. Lieut. G. R. HOWSAM, Gen. List and R.F.C.—In aerial combats he has destroyed five enemy machines and driven down others out of control, showing splendid courage and initiative on all occasions.

Lieut. F. R. MCCALL, Can. Inf., and R.F.C.—While observing artillery fire he attacked an enemy scout and destroyed it. He has set a fine example of courage and determination on all occasions, and has rendered most valuable service.

Lieut. (T. Capt.) P. D. ROBINSON, R.F.C., Spec. Res.—While on a photographic reconnaissance he was attacked by 10 enemy aeroplanes. He handled his machine with such skill that his observer shot down two enemy machines and dispersed the remainder. Though his machine was very badly damaged and almost unmanageable, he continued to take photographs, and finally brought his machine back safely. He has taken part in a large number of photographic reconnaissances and over 70 bomb raids, and has shown the greatest courage and determination on all occasions.

T. Sec. Lieut. (T. Capt.) B. J. SILLY, Gen. List and R.F.C.—He has led several successful bomb raids and carried out many long-distance reconnaissances. By his skill and determination he has invariably set a fine example to his squadron.

Sec. Lieut. A. WALD, R.F.C., Spec. Res.—He carried out a large number of night bomb raids on enemy headquarters, aerodromes, and railways with great success. Many of these flights were carried out in bad weather and at very low altitudes. On one occasion, though he had engine trouble and his radiator burst when he was over the enemy's line, he continued his flight and bombed a railway station from 1,500 ft. He set a fine example of determination to his squadron.

Services to the War Office.

THE names of the following have been brought to the notice of the Secretary of State for War for valuable services rendered in connection with the war, and when applicable, an entry will be made in the records of service of officers:—

Hearson, Major (T. Brig.-Gen.) J. G., D.S.O., R.E., attd. R.A.F.; Ludlow-Hewitt, Capt. and Bt.-Major (T. Brig.-Gen.) E. R., D.S.O., M.C., R.I.Rif., attd. R.A.F.; Wakefield, Hon. Col. Sir C. C., Bart., City of Lon. Vol. R.; Critchley, Lieut.-Col. (T. Brig.-Gen.) A. C., D.S.O., Can. Training School; Brown, Major, A. A. J., Aus. F.C.

French Honours for British Flyers.

IT was announced in a supplement to the *London Gazette* on August 17th that the following decorations have been awarded by the President of the French Republic for distinguished services rendered during the course of the campaign:—

Croix de Guerre.

Capt. O. I. Preston, M.C., Notts and Derby R. and R.A.F.

Legion d'Honneur—Croix de Chevalier.

Brevet Major (T. Lieut.-Col.) W. R. Freeman, D.S.O., M.C., Manch. and R.F.C.; Capt. (T. Lieut.-Col.) C. T. Maclean, M.C., R. Scots F. and R.F.C.; Temp. Capt. G. F. W. Zimmer, Gen. L. and R.F.C.

Croix de Guerre.

Major G. T. J. Barry, S. Wales B. and R.F.C.; Capt. F. N. Chadwick, Manch and R.F.C.; Temp. Sec. Lieut. J. Day, Gen. L. and R.F.C.; Temp. Capt. R. P. Fenn, Gen. L. and R.F.C.; Lieut. E. D. Hall, North'd. F. and R.F.C.; Temp. Capt. J. D. Hedley, Gen. L. and R.F.C.; Temp. Sec. Lieut. A. F. McGlashan, Gen. L. and R.F.C.; 37107 Sergt. F. J. Appleton, R.F.C.; 26989 Sergt. J. M. Bainbridge, R.F.C.; 38336 1st Air-Mech. E. Davidson, R.F.C.; 113763 Sergt. C. Hagan, R.F.C.; 93775 Corpl. D. McLean, R.F.C.; 973 Sergt. W. R. McCleery, R.F.C.; M2/049553 Pte. A. Richardson, A.S.C., attd. Anti-Aircraft Bty.; 63901 Sergt. J. R. Wright, R.F.C.

Medaille Militaire.

8571 Sergt. G. Avery, R.F.C.; 6099 1st Air-Mech. H. Fraser, R.F.C.; 1187 Temp. Sergt.-Major A. Gee, R.F.C.; 58311 Sergt. K. Gellan, R.F.C.; 78354 1st Air-Mech. P. Neville-Smith, R.F.C.; 7813 1st Air-Mech. W. P. Pryke, R.F.C.

Croix de Guerre.

Brev. Col. (Temp. Brig.-Gen.) T. I. Webb-Bowen, C.M.G., Bedford.

IV.—ANOTHER EXTRAORDINARY INCIDENT IN THE ORDINARY LIFE OF ORDINARY PILOTS.

TO-DAY we had a comic show, at least we only found it comic afterwards. At first we thought it was going to be a case of another of —— in the casualty list. However, all's well that ends well.

This evening the Flight did a long O.P. (I am not going to say again what O.P. means. Everyone who reads "FLIGHT" ought to know by now, and if they don't they would be better employed studying "Bassinette Literature" rather than "FLIGHT"). The sun was well down in the west, there was a cloudless sky, and a thick haze which made it impossible to see anything at all of the ground, looking westward, in fact one could only just see the ground below one, above three thousand feet.

The patrol branched off down south, crossed the lines in of A——, with a good wind blowing them over into "Hunland," and a good haze which prevented "Archie" being able to practise his wiles on the patrol. The only way the leader could keep his bearings was to steer by the sun, with occasional glimpses of trenches or ruined villages below. After going east for about five minutes, machines suddenly seemed to appear from nowhere in ones or twos, both above and below the patrol. The leader kept his eyes well open, and watched Hun machines collecting by twos and threes up in the sun between the patrol and the lines, about five thousand feet above the patrol, which was then flying about nine thousand feet. As the patrol got above D—— they saw a formation of six Huns below them gliding down to their aerodrome, and a comfortable hot tea, or whatever the Huns have instead of tea. I have heard that their favourite dish at about five "Pip Emma" is "Roast Rumpler," both economical in ingredients and tasty to eat.

The recipe is as follows; Take a crashed Rumpler, reduce it to pulp (if this has not already been done by the pilot), add boiling glycerine produce (Leave you to guess what factory that comes from), stir gently and serve up same in a well seasoned flying cap. This dish is highly thought of by the Higher Command, being well "Forte" to the palate.

To continue; Tea seemed a long way off to all the pilots just then. They were ten miles over, about eighteen Huns above, between them and home, while there were six Huns "cold meat" below them, but all knew it would be asking for trouble to dive, because if the six Camels once started down, all the Huns from above would come down like a ton of bricks on top of them, and everyone would have a very poor chance of getting back against the wind, and against such odds. The leader did the only thing; he stuck his nose down hard North-East, followed hard by the rest of the patrol.

The Huns behind rushed along to overtake the patrol, and got in a position due south of the Camels, but by the time this had happened the patrol was about seventeen miles over Hunland. The leader then changed course to North-West. The Huns, not realising what the leader was up to, hesitated for a second, in which time the Camels had got about a mile and a half away. The leader held on his course, taking no notice of two formations more of Huns below him, going home to roost, which in the ordinary course of events would have been rudely interrupted from their peaceful "end of a perfect day" joy-ride. He held on his course, but when about five miles from the lines, two Huns came down to the Camels, and sat about three hundred yards behind the back man, sniping hard at him. The leader took in the situation, and came to the conclusion it was no time for, "comic heroics." If he turned his formation back to help the back man, he would give the pursuing Huns, who had now reached to the number of twenty, the chance they wanted, and would probably sacrifice his whole patrol for the sake of one man, who was being "shot up" by two Huns. Not good enough, he decided, and held on his course, but going as slowly as he dared. When about four thousand feet up and about two miles from the lines, the leader saw the back man put down his nose, and dive steeply into the fog below the rest of the formation.

The rest of the formation crossed the trenches safely, came down through the fog, picked up their bearings, and flew back to the aerodrome.

When they got back, all corroborated the leader's report about the Huns, but all differed as to what had occured to H—, who was the back man. Some said he could not have reached the lines, others that he would be in the trenches, others that he would never be heard of again, that he was certain to have been killed. Suddenly this "mothers' meeting," where everyone was shouting and talking at once was broken up by another pilot who rushed up, and gasped out in short breaths the statement that H— had landed at C——, another large aerodrome near where the patrol had recrossed, the machine had crashed, caught fire, H— was badly burnt, and not expected to live. I went to the telephone, rang up —— and asked what had happened. An orderly answered me, and told me that H— had landed crashed, not caught fire, but had been rushed off to hospital badly wounded. I had hardly put down the receiver before the bell rang again and a voice said "H— speaking, can you send over a tender for me, please?" It thought it must be his ghost speaking, and could not believe it was really him till I had heard his story.

To begin with H— had never seen the two Huns from start to finish. He has been intent on keeping up with the patrol, and had never thought of any Huns coming down behind him, till he heard two bangs, and his engine stopped. He dived down at once (which was when we had seen him go below us). He pumped hard to get up pressure, but nothing happened, so he turned on to his gravity tank, whereupon his engine started up again. By this time he felt a burning stinging feeling in a certain part of the anatomy which is used to sit on and was in so much pain that he was sure he must have bee nwounded. He made his way to —— aerodrome, landed down wind, and turned "base over apex" in a ditch at the end of the aerodrome. Mechanics had rushed up to see if he was hurt, and by this time he was in such pain that he shouted out, "Take care how you lift me out. I am wounded in my back." One of the men rushed away and got the ambulance tender out to the machine. They lifted out the pilot, put him face down on a stretcher and took him "all out" to the Casualty Clearing Station about a mile away.

H— heaved himself out of the tender, walked with difficulty into the receiving ward, when a doctor whipped off his pants and found—nothing!! except a large red patch on H—'s skin. H— said he had never felt such a fool in his life, until the doctor told him that he must have been in more pain than he would have been if he had been hit. All the back of his flying kit and clothes had been saturated with petrol, which had burnt his skin for the preceding half-hour, causing him excruciating agony. Ten minutes later, H—, having had some ointment put on his burn, went back to the machine, and on examination found that his main petrol tank behind his seat had two large bullet holes through it, and that the whole machine was soaked in petrol.

An hour later H—was back at the squadron none the worse except that he showed a marked reluctance to sit down on any proffered seat.

I repeat again, "all's well that ends well."

H.B.

▣ ▣ ▣ ▣

Raid on Paris.

THE following official *communiqué* was issued in Paris on August 16th:—

"The noise of engines having been reported by our look-out posts in the northern district of Paris, the alarm was given at 10.52 p.m. The enemy machines encountered a violent fire from our anti-aircraft batteries. Several bombs were dropped in the Paris district. There were some casualties, and some material damage was done. The 'All Clear' was sounded at 12.36 a.m."

A Raid on Dunkirk.

AN aerial attack was made on Dunkirk on the night of August 12t.h The raid lasted two hours, and half a dozen large bombs were dropped. One fell on a large building used by the Allies for ambulance purposes. Two members of the staff were killed and six injured.

A Survivor of the Destroyed Zepp.

THE *Tyd* on August 14th reported that one survivor of the crew of the Zeppelin which was shot down by the British off Ameland on August 11th had been picked up by a trawler and landed at Ymuiden.

Bombing in Mid-Air.

AMONG the many extraordinary incidents of the recent fighting was the feat of one of our pilots who wrecked an enemy machine below him by dropping a bomb on it. The bomb is said to have hit the enemy fairly, and there was nothing left of it in the air.

FLIGHT

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS.

FLYING SERVICES FUND COMMITTEE.

A MEETING of the Flying Services Fund Committee was held on Thursday, August 15th, 1918, when there were present :—Brig.-Gen. W. W. Warner, R.A.F., in the Chair ; Mr. Chester Fox and Lieut.-Com. H. E. Perrin, R.N.V.R., secretary.

Grants and Allowances.—The following grants and allowances were made :—

40. An allowance of £2 a month for six months to the widow of a Sergeant in the Royal Flying Corps who was killed on active service.

41. An allowance of £3 a month for six months to the mother of a Chief Petty Officer in the Royal Naval Air Service who was killed on active service.

54. An allowance of £2 a month for six months to a First-Class Air-Mechanic in the Royal Flying Corps who had been incapacitated on active service.

55. An allowance of £4 a month for six months to the widow of a First Class Air-Mechanic in the Royal Flying Corps who was killed on active service.

58. An allowance of £3 a month for six months to the widow of an Air-Mechanic in the Royal Naval Air Service who was accidentally killed on active service.

66. An allowance of £1 a month for six months to the mother of a Flight-Sergeant in the Royal Flying Corps who was killed on active service.

67. An allowance of £1 a month for six months to the mother of a Third-Class Air-Mechanic in the Royal Flying Corps who had died from wounds received on active service.

69. An allowance of £1 a month for six months to the widow of a Third-Class Air-Mechanic in the Royal Flying Corps who was killed on active service.

70. An allowance of £1 a month for six months to the mother of a Second-Class Air-Mechanic in the Royal Flying Corps who had died on active service.

THE FLYING SERVICES FUND

(Registered under the War Charities Act, 1916).

Honorary Treasurer:
The Right Hon. LORD KINNAIRD.

Committee:
Brig.-Gen. W. W. WARNER, R.A.F. (*Chairman*).
Mr. CHESTER FOX.
Lieut.-Col. HARCOURT G. GOLD, R.A.F.
Lieut.-Col. T. O'B. HUBBARD, M.C., R.A.F.
Lieut.-Col. C. E. MAUDE, R.A.F.

Secretary:
Lieut.-Com. H. E. PERRIN, R.N.V.R.

Bankers:
Messrs. BARCLAY'S BANK, LTD., 4, Pall Mall East, London, S.W. 1.

Objects:

The Lords Commissioners of the Admiralty and the Army Council having signified their approval, THE ROYAL AERO CLUB has instituted and is administering this Fund for the benefit of Officers, Non-Commissioned Officers and Men of the Royal Air Forces who are incapacitated on active service, and for the widows and dependants of those who are killed.

Subscriptions.	£	s.	d.
Total subscriptions received to August 1st, 1918	12,851	19	3
Staff and Workers of Gwynnes, Ltd. (Sixty-eighth contribution)	8	13	7
Profit derived from Concert held at Southampton, May 24th, 1918	126	15	4
Subscribed by the Officers, Non-Commissioned Officers, and Men of the Repair Park, No. 2 Aero S.D., Royal Air Force, British Expeditionary Force. Frs. 1,000.			
Total, August 20th, 1918	12,987	8	2

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W.1,
H. E. PERRIN, Secretary.

THE NATIONAL PHYSICAL LABORATORY, REPORT FOR THE YEAR 1917-1918.

BEFORE the war the receipt of the yearly report of the above institution, and especially of the report of the Advisory Committee for Aeronautics, was an event to be looked forward to, incorporating as it did the results of the latest researches and experiments in connection with the science of aviation. Since the war, however, it has for obvious reasons been found undesirable to publish such results, and the consequence has been that as far as the ordinary student of aeronautics is concerned the knowledge of aerodynamic experiments on aircraft or their parts is four or five years out of date. That this should be so is lamentable, but it is difficult to see how it could be avoided without running the risk of furnishing the enemy with the results of our latest researches into the problems of this new branch of science. One's consolation must be that when the war is over there will be in store for the student of aviation and all its problems a vast fund of information which will form an excellent basis for the solution of the problems that will confront us when it comes to the development of flying for peaceful commercial purposes. At present, however, the yearly report of the N.P.L.—of which we have just received that for the year 1917-18—confines itself to the briefest indication of the activities at Teddington. It is gratifying to learn that the aeronautics section of the laboratory has been and is still constantly being extended. Among the buildings under construction is a new aeronautics building. Two 7-foot wind channels are at present available for aeronautics research, in addition to two 4-foot and one 3-foot channels. During recent years the use of the larger channels, with higher wind speeds, has been found to be of increasing importance, and in view of the great number of investigations demanding attention, the Air Ministry has arranged for the provision of two additional channels.

Considerable developments have occurred in the work undertaken for the Advisory Committee for Aeronautics. In order to deal more fully with the several branches of the work, the Committee has appointed three Sub-Committees which sit regularly, and other Sub-Committees have been constituted from time to time to deal with special matters. An Air Inventions Committee and an Accidents Committee have been constituted by the Air Ministry, which report to the Advisory Committee and on which that Committee is fully represented.

In the Electrotechnics Division much time has been devoted to research on magnetos for the Engine Sub-Committee of the Advisory Committee for Aeronautics, and work on searchlight carbons is being carried out for the Admiralty and War Office. A large amount of work has been done in connection with height finders, and advice and assistance has been directly given, both in France and in the course of inspection of instruments installed in this country. In the Heat Division a considerable number of conductivity and other tests have been carried out for the Light Alloys Sub-Committee of the Advisory Committee for Aeronautics.

In the Aerodynamics Department changes have taken place on the staff. Mr. Bairstow left the Laboratory early in the year to take up work under the Air Board, and Dr. Stanton has since resumed control of the Division. Mr. Relf holds the rank of Senior Assistant, and Mr. Pannell and Mr. Fage have recently received promotion to that rank. The volume of work to be dealt with still continues to increase. The necessity of employing large models for certain classes of work has led to a very great demand for the use of the larger channels. The need of additional large channels has become urgent, and as already mentioned two are being provided in the new buildings. A very large programme of research has been carried out during the year. The work has been of the most varied character, including experiments on models of all types of aircraft, with a number of investigations relating to special matters. Tests have been made on models of aeroplane wings, both monoplane and biplane models of complete aeroplanes, airship and kite balloon models, models of airscrews, with calculations relating to stability, strength of construction, bomb dropping, &c. A large amount of work has been done in connection with the design of wind channels. The research on eddy-motion has been continued. A considerable number of the investigations were made in response to specific requests from the Air Ministry, but every endeavour has been made to increase the value of special tests by bringing them into their proper relation as part of an organised scheme of research.

The section of the Chemistry Division which deals with

fabrics, dopes, &c., has been very actively engaged throughout the year.

The Engineering Department reports having made experiments on the effect of surface roughness on the heat transmitted from hot bodies to fluids flowing over them. The results of experiments for determining the heat transmission to water from the internal surfaces of brass pipes smoothed and roughened showed that with the amount of roughening obtained the heat transmission per unit surface per degree difference of temperature between the metal and the water for the smooth pipe could be increased in the ratio of about 2·5 to 1 for the same mean velocity of flow. It was obvious that if improvements of this order could be made in the surfaces of air-cooled engines and radiators, considerable economy in material could be effected in aeroplane engine design. To test this question a series of copper gills of the form and distribution commonly adopted in air-cooled engines were fixed to a cylinder of the engine and set up in a wind channel. An electric current from a storage battery was then circulated through the gills, and from measurements of the current and resistance it was possible to obtain the temperature of the gills and the heat dissipated. The gills were first tested in their ordinary smooth condition, and were then roughened by means of corrugated steel dies. In these experiments the roughening appeared to produce practically no effect on the heat transmission, this result indicating that the convection of momentum to the rough and smooth surfaces was approximately the same in each case. The precise reason for the apparent discrepancy between the two sets of observations is still under investigation.

This department has also made tests on half-size streamline struts in order to compare the relative values of different kinds of wood for this purpose. Each strut was tested with an axial end load, and by the use of compound knife edges each end of the strut was free to take up any angular position when under test. The modulus of elasticity for each material was found by a bending test, and this value was used to calculate the critical load to cause indefinite bending according to the Euler theory for a simple strut. The agreement between these critical loads calculated from the dimensions of the strut and the modulus of elasticity of the material and the observed loads causing failure was remarkably good, indicating that the end constraint obtained with the special device adopted was negligible.

COST OF THE U.S. AIR MAIL SERVICE.

SOME authoritative figures are now available regarding the cost of aerial mail services, the following being embodied in a report on the operation and maintenance of the U.S. air mail service by Otto Praeger, second assistant postmaster-general. The report covers the period from the start of the service, on May 15th, to the end of that month.

As may be seen in Table I, nine aeroplanes were at the time employed in the service, the first six being Curtiss JN-4H machines, fitted with 150 p.h. Hispano-Suiza engines, while the three last were Curtiss R-4 biplanes fitted with 350 h.p. Liberty engines. Since all these machines are the property of the Army Air Service, the Post Office authorities have no information as to their cost.

In the report no account is taken of the very important item of depreciation because no convincing data are said to be available on this subject, nor are any data furnished concerning the wear to which the machines have been subjected or their age at the time of starting the service. The items of rent, light, power, miscellaneous expenditures, dead time of pilots and hangar men, shop time of mechanics and departmental overhead charges, all of which are not directly apportionable to individual machines, are prorated equally between all aeroplanes. Whether it would have been more satisfactory for determining the actual work done to apportion these items in proportion to the mileage made by each machine is a question that only cost accountants could settle.

With reference to Table II, it may be noted that the three mail planes fitted with Liberty engines averaged a higher cost per hour and per mile, with lower miles run per gallon of gasoline, than the machines fitted with Hispano-Suiza engines. This was, of course, to be expected, since the Curtiss R-4 is a much larger machine than the JN-4H model, and the Liberty-12 is much more powerful than the 150 h.p. Hispano-Suiza.

A careful study of the appended tables may develop many interesting points, and should give to those interested in the development of commercial aeronautics the first reliable data on which to base the cost of operating an air mail service.

TABLE I.—(See footnote.)

Aeroplane No.	Gas.	Grease and oil.	Pilots.		Hangar men.		Mechanics.		Repairs and accessories.	Total.*
			Actual time.	Dead time.	On plane.	Miscellaneous.	On plane.	Shop time.		
	$	$	$	$	$	$	$	$	$	$
37994	15·75	2·71	26·68	21·73	8·35	9·72	102·20	9·72	9·77	229·70
38262	20·32	4·79	16·92	21·73	1·99	9·72	21·87	9·72	125·50	325·63
38274	75·13	21·83	73·32	21·73	2·00	9·72	140·12	9·72	11·05	457·69
38275	77·49	25·48	68·70	21·73	1·87	9·72	167·05	9·72	142·72	617·55
38276	54·57	10·22	66·30	21·73	1·87	9·72	152·43	9·72	27·89	447·51
38278	73·83	20·48	96·25	21·73	18·97	9·72	352·47	9·72	51·78	747·11
39365	27·90	5·58	14·54	21·74	6·73	9·72	68·98	9·72	5·42	263·40
39366	37·50	2·50	23·42	21·74	3·49	9·73	90·06	9·73	16·52	307·77
39367	22·80	4·28	13·27	21·74	1·87	9·73	34·97	9·73	4·22	215·75
Totals ..	405·29	97·87	399·40	195·60	46·24	87·50	1130·15	87·50	394·87	3682·11

TABLE II.—SERVICE AND UNIT COST.

Aeroplane No.	Gal. of gas.	Total time run.	Total miles run.	Miles run per gal. of gas.	Cost per hour.	Cost per mile.
		h. m.			$	$
37994	62	7 19	550	8·88	40·96	·5449
38262	71	11 56	239	3·38	27·28	1·3624
38274	258	19 50	1365	5·29	23·08	·3353
38275	262	19 24	1247	4·75	31·83	·4952
38276	105	15 40	1024	5·52	28·56	·4370
38278	245	26 40	1719	7·01	28·01	·4346
39365	93	3 00	280	3·01	87·80	·9407
39366	125	6 28	540	4·32	47·59	·5699
39367	76	2 51	270	3·55	35·70	·7990
Totals ..	1377	113 8	7234	5·25	32·54	·5090

* Each machine was also allotted the following charges, which are included in the total: Office force, $11.78; motor cycle, trucks, $12.40. Rent, light, fuel, power, telephone and water, $22.06. Misc., $2.66; Interest on investment, $27.56; departmental overhead charge, $16.66.

Trafficking in Italian Leaflets in Austria.

IT appears that there has been lively business done in the leaflets dropped by the Italian aviators. The *Wiener Arbeiter Zeitung*, writing on the subject, says:—

"A considerable number of handbills was dropped near the Exchange. This gave frequenters of the Exchange an opportunity promptly to open a lively business in these papers. With the growing demand there has developed a large traffic, and the handbills must have fetched 30kr. and 40kr. (25*s.* to 33*s.* 4*d.*) each."

A Squeal from the Hun.

THE efficiency of our air work in attacking billets at the front has received valuable testimony in the shape of an order by General Kuhne, whose 11th Corps was severely handled during the British onrush of August 8th. Dated July 21st, it starts: "The bloody losses recently caused by enemy air raids on billets within the corps area show that the system of air raid alarms is not well organised and that the protection available against bombs is inadequate."

New German Tactics.

"THE Germans inaugurated a new practice on the night of August 16th," says the *New York Herald* correspondent on the Vesle front. "Commencing at 10 p.m. and continuing until daybreak, a dozen large bombing aeroplanes flying over the American back areas dropped aerial torpedoes where they supposed the American troops to be quartered." Another correspondent says that the Germans are now using a new flare which lights up the ground for an area of a mile.

FLIGHT
AIRCRAFT ENGINEER

"A PLEA FOR LIGHT ALLOYS IN AIRCRAFT CONSTRUCTION."

BEING A SEQUEL TO A "POST-WAR AEROPLANE."

By F. W. HALLIWELL, A.M.I.A.E.

AIRCRAFT of the present day are unique among similar productions of the engineering industry in perhaps more directions than one, but it is with regard to the materials employed that their insularity is most noticeable. The building of aeroplanes is essentially the business of an engineer, and timber, which is largely employed in aeroplane construction, is not usually associated with the work of an engineer, excepting for special fitments of more or less decorative nature, and for accessories which are added for comfort's sake, or to give a finish to the product. Therefore, after consideration, the fact that wood is universally used for the *fuselage* and wings of aeroplanes, gives one to think rather furiously. It is obvious that there must be some decided advantage to be gained by its use, either from the designer's or the manufacturer's point of view, and upon carefully going into the manufacturing side of the problem, it will be seen that, for ease and speed of working, coupled with the facility with which scrap parts may be replaced, or alterations made, or even the whole design changed, without affecting the tools, that there is no other material to compare with it. Also, by reason of the number of operations which can be performed on one kind of machine, which means that the wood-worker only requires two or three different types, where the metal-worker would probably require four or five, the capital outlay required to lay down, and the cost of maintenance of, wood-working plant are much smaller than that necessary for the installation and upkeep of any factory of the same size, turning out metal products.

Undoubtedly the foregoing among other reasons have influenced manufacturers in favour of the present construction, while the absolute necessity of lightness has tied designers down to a very great extent. Another feature which must appear to the average engineer fresh from any other branch of industry, as a "nasty un-mechanical job," is the use of doped fabric. Here again designers have followed closely in the footsteps of their predecessors, endeavouring to improve existing methods rather than investigate any new line of progress. Taking a broad outlook and glancing back over engineering history it is easy to find analogous cases to that of the aeroplane. The most apparent, namely, that of the ship, is also that of the nearest allied branch of design, and it is possible to trace the development of a modern warship from canoes built of skins upon a wooden framework, through successive stages of timber constructions, noticing the gradual encroachment of metal work, until the present-day product is reached. There are many other similar cases which, if not so apparent, are equally significant. Are we to believe then that the aeroplane has reached its ultimate state so far as constructional design is concerned? It would hardly appear so.

Coming down to concrete facts, however, in order to see what may be gained, it is necessary to review the advantages and disadvantages of the present system of aircraft construction, and also that of any proposed design in metal. Assuming for the moment that it is possible to build a machine of some light alloy, which shall have the same strength/weight ratio as any existing model, what advantages can be claimed for it over and above those possessed by the more orthodox construction? From the designer's point of view any structure of metal is better than one of wood, because more accurate workmanship is possible and consequently the job is within closer limits, also there is less uncertainty about the ultimate strength of the material, which means that a smaller factor of safety can be used. For instance, when a spar is made in spruce, a factor of safety of about ten is often employed. If the timber happens to be a faulty piece, this may be just enough to prevent the material being stressed beyond its elastic limit; if, however, it chances to be a good piece, free from defects, the factor of safety is much greater than is necessary and the spar much heavier than need be, yet this cannot be reduced because of the varying quality of the material. Another point which commends the metal construction to the designer is the comparative ease with which it can be adapted to streamline shapes making for aerodynamical efficiency, also it lends itself well to quantity production, in which case the parts would be to a great extent interchangeable. Inspection would be simpler, due to more accurate workmanship, and less likelihood of hidden flaws in the material. Considering the question from the standpoint of the user, it is apparent that less maintenance work will be necessary, as there is no fabric to become "soggy," nor timber to warp or buckle in sympathy with the weather, and few, if any, bracing wires to adjust. The useful life of a metal machine would, under ordinary conditions, be much longer, as it would be much more impervious to the action of the elements, while its surface would not be affected by oil or petrol as is the fabric of an ordinary aeroplane. Its non-inflammability would be a strong point in its favour; as long as the engine was screened and the petrol and oil tanks were so placed that a bare flame could not effect a passage to them, any danger of fire in the air would be non-existent, while to-day, on certain types of machines, it is ever present.

Having enumerated all the points upon which the metal construction possesses a more or less distinct advantage, it will be remembered that so far we have only assumed that it is possible to build a machine with the same strength/weight ratio. It is now proposed to show that not only is this possible, but that it is quite likely that the present figures could be improved upon. Duralumin is the only metal possessing the necessary strength for weight, which up to the present is in anything like common use. It is in this direction that the metallurgist can be of considerable help to the aircraft industry. In an ordinary tractor aeroplane

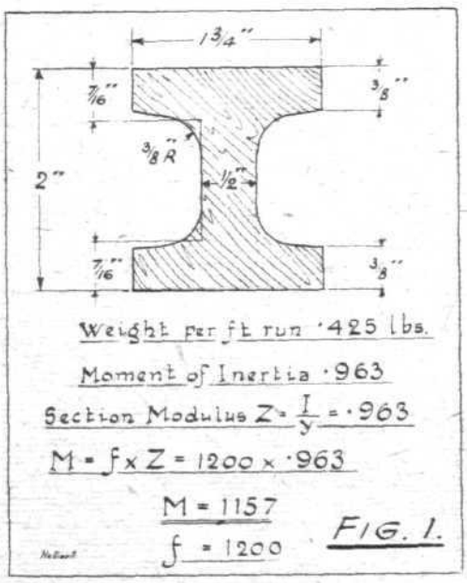


FIG. 1.

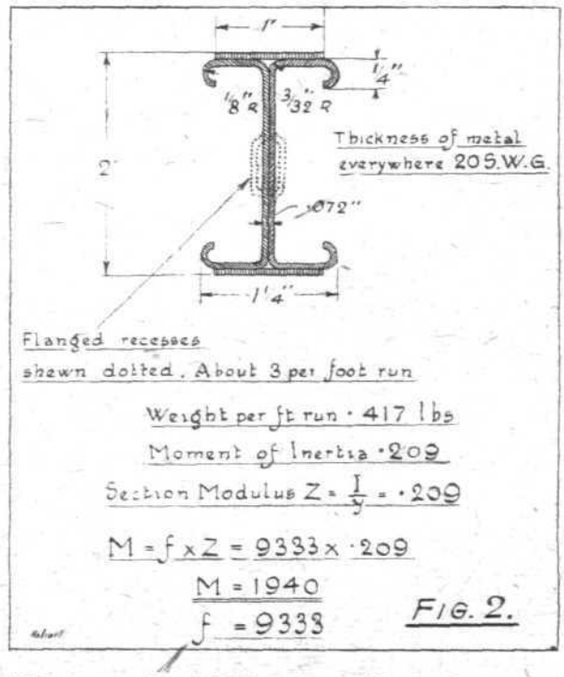


FIG. 2.

the majority of the more important members are stressed as beams. The wing spars are subjected to bending moments, and are generally regarded as continuous beams with the number of supports according to the number of interplane struts, while the *fuselage* is usually considered as a cantilever. It would therefore seem reasonable to suppose that the material which, as a beam, is stronger for the same weight per foot run can be built up into a machine which shall itself be lighter for the same strength than the orthodox construction. With this object in view it is proposed to compare two wing spar sections, one of Californian spruce and one of Duralumin. Fig. 1 represents a section of typical proportions, the weight per foot run in Californian spruce, being .425 lb. Fig. 2 represents a section built up in Duralumin to the same depth limit, viz., 2 ins.; its weight per foot run is .417 lb., which is slightly less than that of the spruce section. For Fig. 1 f can be taken as 12,000, and using a factor of safety of 10, reduces to 1,200. For Fig. 2, f can be taken as 56,000, and using a factor of safety of 6 (which is not too small), reduces to 9,333. M for Fig. 1 comes out to 1,157, and for Fig. 2, 1,940. This shows a gain of 40 per cent. of strength for the same weight, while the Duralumin spar is actually not quite so heavy as the spruce one. The weight of the flanged recesses shown dotted has been taken into account, but they have not been considered when calculating the moment of inertia. The rivets have not been taken into account in either case; this is probably more than balanced by the extra weight of fittings, &c., and portions of the spar where the spindling is not carried through, in the case of the spruce spar. This construction of Duralumin spar shown is patented.

Having proved that metal is superior as far as strength for weight goes, and taking into account the advantages outlined above, it would seem that the case for the all-metal machine is well founded from the point of view of the designer, and also from that of the user. We have now to consider the question of comparative cost of, and incidentally the speed of production. The operations required to produce the *longerons*, such as planing up and spindling, would probably be just about balanced by the operations necessary for rolling the longitudinal members of a metal *fuselage*, and though *fuselage* struts are quickly and easily made, we must also consider the relatively large number of them, and their accompanying wires, turnbuckles, shackles, &c.; against all these we probably have the production of a few flanged transverse members in most cases blanked out in one operation. Some time would no doubt be gained here by the metal construction. In the case of the orthodox machine by far the biggest proportion of time and labour is spent in assembling the sides of, and erecting, and trueing the *fuselage* itself.

The *fuselage* of an average up-to-date machine of the scout type can be completed in approximately 550 to 660 man hours. These may be divided up somewhat as follows:—

	Man hours.
1. Assembling sides alone (in jig)	60 to 80
2. Erecting sides	130 to 160
3. Fitting and trueing engine bearers or plates	60 to 100
4. Fitting and trueing undercarriage	12 to 15
5. Fitting fairing, decking, &c.	80 to 90
6. Installation of tanks and pressure and petrol system	Approx. 40
7. Installation of engine, guns and gun gear	„ 80
8. Assembling and fitting controls and control cables	„ 30
9. Installation of water pipes (if water cooled) and Radiators	„ 40
10. Painting and finishing and fitting cowling	20 to 25

From the above figures it may be seen that approximately 50 per cent. of the total man hours are spent in erecting and trueing the *fuselage* itself. Considering the metal *fuselage*, against these 330 man hours we should have to put the time for erecting the transverse members in the longitudinals and fitting the shell complete and riveting up.

Assuming a fair output per week, this would probably amount to 100 man hours in the best cases, and not more than 200 in the worst. This, of course, is only an estimated figure, but it would seem obvious that the metal *fuselage* would score heavily on erection times. With regard to times for installing engine, petrol tank, piping, &c., it is probable that these would work out about the same for each construction. As in the metal machine there is no fabric, more time and money would be saved here by the non-existence of the dope shop. The point might be raised that press tools, dies, &c., would prove a large item in the costs, but actually the number of dies and punches involved would probably be less than for the average present-day machine, with its numberless small *fuselage* clips and fittings, very often all of different sizes and shapes. The shell itself and similar parts could in most cases be made in wooden dies, while the longitudinals would be rolled.

Summing up the case for production, it is very difficult to compare with accuracy the relative costs of the two constructions, as all figures for an entirely new type of machine can of necessity only be estimated, but with the saving which could be effected on *fuselage* erection, and the fact that the "trueing" of the *fuselage* and doping would no longer be necessary, it would seem reasonable to regard the all-metal machine favourably from a manufacturing point of view as well.

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AIR RAIDS ON GERMANY IN JULY.

DURING the month of July no fewer than 100 raids were carried out by the R.A.F. Independent Force, of which 96 were into Germany itself. In all 81 tons of bombs were dropped upon important military objectives during these raids. It is a significant fact that, notwithstanding the frequent periods of bad weather, the month's work constitutes a record, both as regards the number of raids undertaken and the weight of bombs dropped. The previous best month was June last, when 74 raids were made into German territory, and 61½ tons of bombs dropped.

The following is a list showing the towns raided, the precise military objectives upon which the bombs were discharged, and the number of separate occasions upon which each place was raided. This list covers only the work of the R.A.F. Independent Force, apart altogether from the immense weight of bombs dropped by Royal Air Force airmen throughout the Western Front, and upon such coastal objectives as Ostend, Zeebrugge, Bruges, &c., or the formidable work of the French Air Service:—

Place.	Military objectives.	Times raided.
Baden	Station	1
Balan-Sedan	Factory	1
Boulay	Aerodrome	13
Brulange	Station	1
Buhl	Aerodrome	3
Burbach	Blast furnaces and works	3
Coblentz	Station, sidings, factories, barracks	3
Courcelles	Junction	1
Dieuze	Aerodrome	1
Falkenberg	Station	1
Freisdorf	Aerodrome	5
Hagenau	Station and barracks	1
Hagondange	Blast furnaces	1
Han	Railway junction	1
Heidelberg	Station	1
Kaiserslautern	Station and factories	2
Karthaus	Railway, engine sheds, workshops	2
Lahr	Station and sidings	2
Lumes	Railway junction	2
Luxembourg	Station, workshops, sidings	1
Malmy	Aerodrome	1
Mannheim	Factories, docks, railways	4
Marville	Aerodrome	1
Metz-Sablons	Railway	5
Morhange	Aerodrome	6
Oberndorf	Powder factory and munition works	2
Offenburg	Station, sidings, engine sheds	7
Pforzheim	Station and factories	1
Rastatt	Station	1
Remilly	Junction	4
Rottwell	Powder factory	1
St. Avold	Aerodrome	1
Saarbruck	Factories and station	3
Saarburg	Junction and sidings	2
Sollingen	Wharves	1
Speyer	Station	1
Stuttgart	Factories and station	2
Thionville	Railway and sidings	5
Treves	Station	2
Vahl Ebersing	Aerodrome	1
Vergaville	Aerodrome	1
Wargassen	Blast furnaces	1
Zweibrucken	Factory	1

FLIGHT

AIRISMS FROM THE FOUR WINDS

IN Ireland matters recruiting are shaping much more reasonably it is rumoured. It is certain anyway that the Emerald Isle is likely to provide a substantial gain for the R.A.F. It's hopeless for them to try to keep out of such sporty chances in this direction which are flying around in the scrap on behalf of civilisation.

MR. HUGHES, the Prime Minister of Australia, does not appear to appreciate much more than we did Col. Grant Morden's claims, to which we referred last week, that practically only Canadians constituted the R.A.F. Opportunity occurred on Saturday at the Dartford Military Hospital for Mr. Hughes to put it his way. This very plain-spoken patriot said: "It is stated in the Press that Canada intends to establish an independent air force. It is a mistake to say that this is the first Dominion Air Force. Units of the Australian Flying Corps went into action at the opening of the Mesopotamia campaign. Our No. 1 Squadron has been fighting all through the Sinai and Palestine campaigns, and our other squadrons have been working in France for the past year. How many Australians there are serving independently with the R.A.F. I do not know. But this I do know, that whether they are with the R.A.F. or the Australian Flying Corps, airmen from Australia will hold their own on any battlefield."

FIGURES from Canada itself to *The Times* as late as August 15th give the total number of Canadians in the R.A.F. as 13,495.

IT is appropriate and a happy inspiration, that the resting-places in France of many of our fearless air pilots who have "gone West" should be marked with broken propellers as "headstones."

"IN the course of a sober but lively examination of Mr. Pocock's plan for travelling by means of kites, Liverpool men of science have decided against the utility of the scheme and against the possibility that man will ever be able to fly. They remark: The *wind*, of all things proverbially the most fickle and changeable, is as necessary to flight as breath is to the life of a man. In the use of this agent there is the triple uncertainty of whether you will have it at all; of its strength; and of its direction."

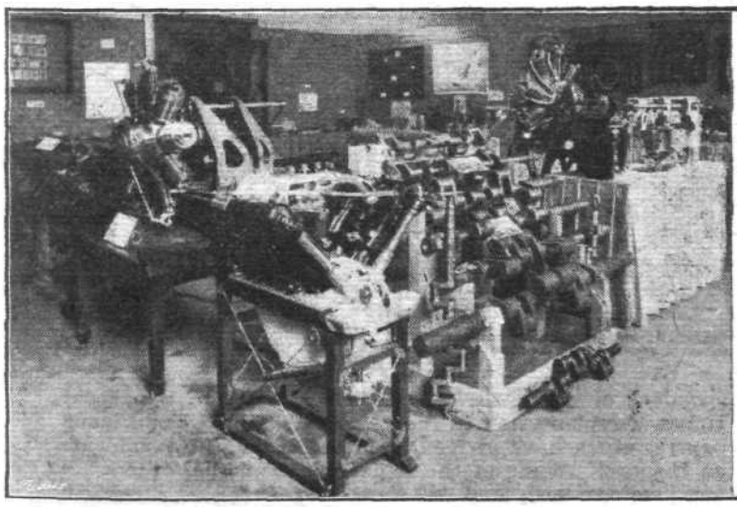
DON'T get worried over the above paragraph. Liverpool is right out for aviation just the same. The quotation is not a case of "10 years ago," but a clipping from No. 304 of the *Sunday Times*, 90 years ago—August 17th, 1828—when the price of our present day contemporary was 7*d*. And paper was not rationed then!

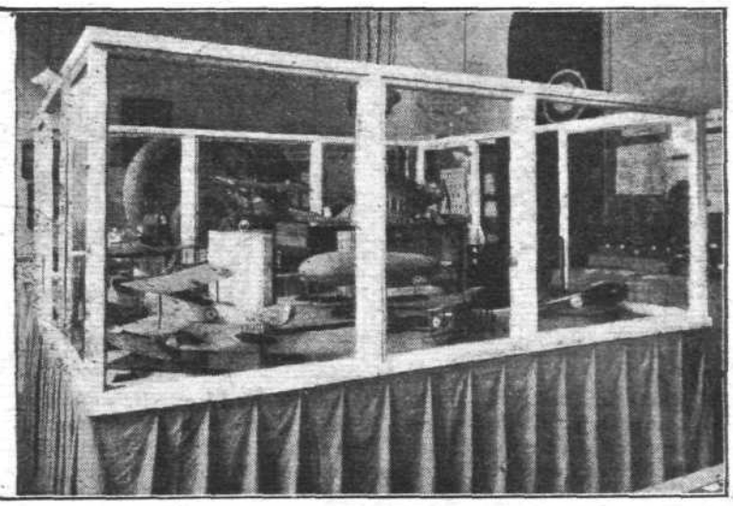
R.A.F. MEMBERS and their adjuncts are accused in all manner of directions of being an especially favoured class in more ways than one. May be, or may not. But now the Farnborough Food Control Committee are up against a definite case, it would appear. The main crime seems to be the tapping of the local profiteers' profits thusly. Soldiers, it is alleged, can buy tinned salmon, which local rampers advertise as cheap at 2*s*. 6*d*., at the canteen of the R. A. Establishment for 1*s*. 3½*d*.! which *is* a bit thick. Robbing the poor struggling local buccaneer of close on 100 per cent. But the question might be asked, Is it even cheap at the canteen figure? Our office cat the other day waxed very savage at the offer of a derelict piece of this unrationed luxury.

THE recent article on "Accidents which should Not Happen," by Mr. Thorburn, and the Editorial reference to the same subject, appear to have had the desired effect. A question was at once put in the House of Commons, and in reply it was stated that a special order on the matter of unnecessary flying and "stunting" over town areas had been issued. Since that date we observe many contemporaries, both daily and weekly, have now taken up the subject, and although personal experience shows that there is still room for improvement, we hope that the foolhardy displays which were becoming all too common, and the fatal accidents which were certainly having some effect on the *moral* of new pilots, will soon be practically unknown.

AT the same time, those who claim to have just cause of complaint should not spoil their case by ridiculous statements, which go far to discount the rest of their "evidence," like unto one, by way of example, signed "H.L.B." in the *Eastbourne Chronicle*. The following is an extract from this correspondent's letter:—

"The complaints one hears are numerous as well as emphatic. I am impelled to write this letter as at this very





Aeronautical Engineering at the British Scientific Products Exhibition, King's College, Strand.—In addition to the many industries not directly connected with aviation there are, at the above exhibition, numerous interesting examples of various branches of aeronautical engineering, which will appeal to every student of aviation. A fairly representative collection of model aeroplanes and airships affords an opportunity of becoming acquainted with the different types, while in another room a number of aero engines, partly in section, enables one to study the internal mechanism of many of the best-known engines used by the Allies. Specimens of various component parts of an aeroplane line the walls, and altogether one can spend a couple of very interesting hours in the aeronautical section only, apart from the undoubted attractions of the rest of the exhibition, a visit to which should not be neglected by anyone who can possibly manage to spare the time.

moment a machine is, and has been, for some ten minutes doing stunts, including looping the loop over my house and garden at a height I should say of not more than 60 to 80 ft."

THERE has been a good deal of talk in the papers lately about giant aeroplanes. A correspondent—who occasionally passes in the train a machine which certainly answers to this description, but which has been solidly planted on the turf of an aerodrome in the Home Counties for several years, and looks like remaining there for the duration of the war—suggests that the planes should be taken off and the whole magnificent structure transformed into a Tank! Then it might be of some use.

SEVERAL officers who have been clever enough to escape from German prison camps have been lunching together at the Royal Aero Club lately. One would gather from their conversation that they are anxious to get recaptured in order to show how much more easily they would escape next time.

EXACTLY how the Huns indicate to their U-boats—from spy information received—the whereabouts of their victims in the open seas must be still a bit of a puzzle to many unacquainted with the problem of mapping out the High Seas. It is a problem so intimately and equally concerned with aviation voyaging that it scarcely needs an apology for reproducing the illustration below, together with its explanation, as given by Mr. Henry Barby in our French contemporary, *L'Illustration*: "The map with its numbered squares is a reproduction of part of a German map discovered in Norway and lately released for publication by the French Censor, and shows how the German Navy plotted the North Sea and English Channel for the use of its submarines.

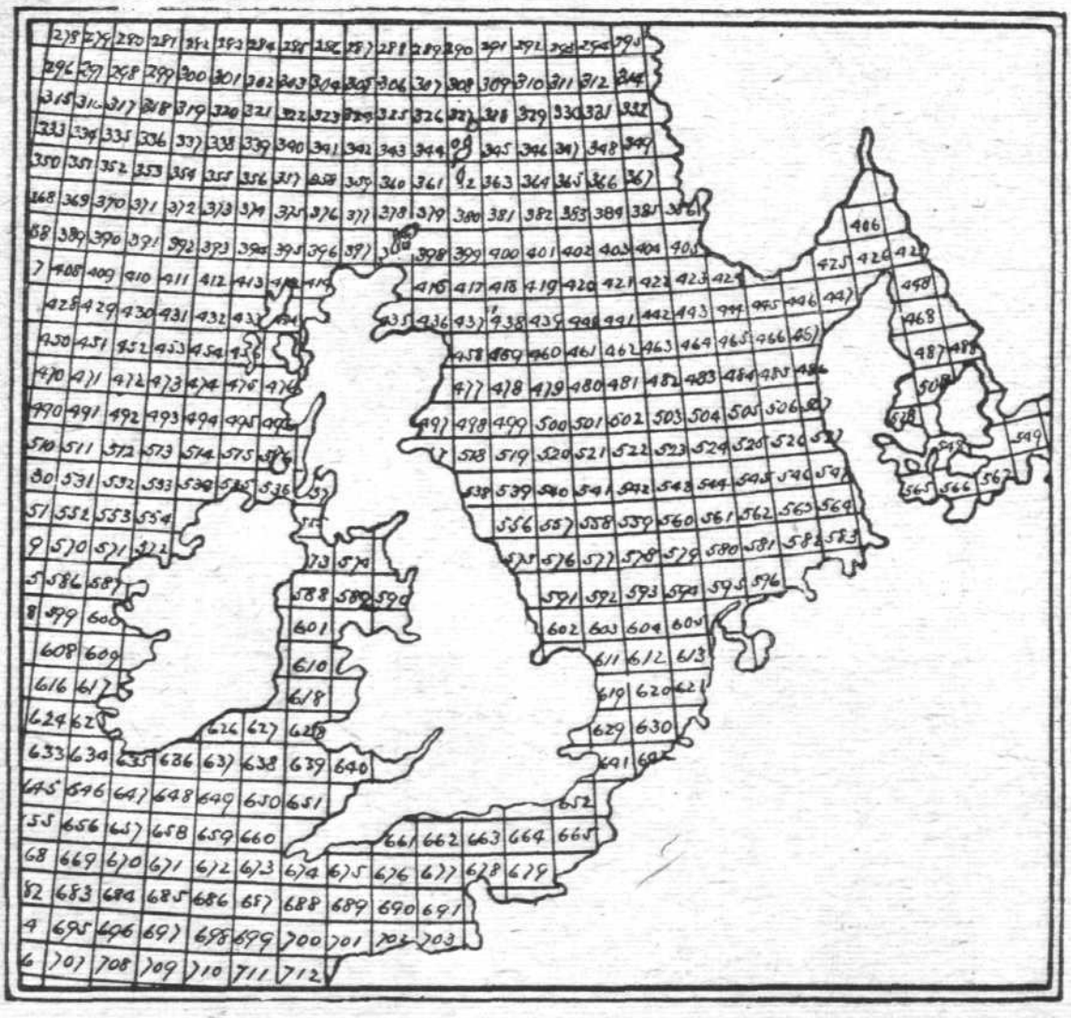
"By the use of a special code the departure of every vessel, its tonnage, speed, route and whether it was a ship of commerce or of war, was wirelessed to the submarine by spies in certain coast towns of the adjacent waters. Mr. Henry Barby's translation of this code, which, it will be seen, is so designed that every message shall seem to refer to some innocent commercial transaction, is as under:—

"The nationality of the vessel is indicated by first, second, third, or fourth quality, meaning in that order, British, German, French, or Russian, while neutral shipping is designated by colours, such as Norwegian, painted black; Swedish, painted blue; Danish, painted red.

"The description of the vessels is designated in the following way: 'Wooden Box, Series 1, means a warship with one smokestack. Series 2, two smokestacks, and so on. Packing case, Series 3, means armoured cruiser, three smokestacks. Metal box, Series 2, 3, or 4, means light cruiser, two, three, or four smokestacks. Barrel, Series 2, 3, or 4, means destroyer, two, three, or four smokestacks. Barrel, Series 1, means a torpedo boat, while the submarines are designated as 'samples' and mines as 'packages.' The position of the boat is indicated by the number of the square on the map. Thus a wireless running 'First quality packing case, Series 4, No. 432,' translated is 'British armoured cruiser, four smokestacks, in square 432.'"

Fortunately (according to the *Scientific American*) good cometh out of this evil, as the discovery of this map and the translation of the code quickly led to the discovery of the wireless stations which were being used by the German spies, and it is said that this discovery and the use the Allies put it to accounts in no small measure for the falling-off in the list of the U-boat victims.

PHOTOGRAPHIC evidence from the air once again gives the lie direct to the camouflaged versions of the enemy of the remarkable work accomplished by the Allies. This time the facts come from Mr. A. Beaumont, the Milan correspondent of the *Daily Telegraph*, and refer to the recent Italian aeroplane visit to the Austrian capital. The Vienna papers, which have arrived at Milan, teem with comments on the raid. Some of the remarks are puerile, others are very embarrassed, and all show that the visit created a deep impression. In justification of the arrival of the enemy machines being a surprise, most of the papers speak of a dense fog, which prevented the aeroplanes being seen. There was fog in the mountain regions along part of the way, but, as regards Vienna itself, the fog there must have been hidden in the newspaper offices, for the Italian aviators have brought back with them most perfect snapshots, showing that the sky was wonderfully clear, without fog or cloud. Vienna is seen with great distinctness, and all the principal thoroughfares, buildings and parks, with their crowds of people and spectators gazing up into the sky, are plainly visible. Trams can be



How British waters were keyed for the benefit of the U.-boat commanders.

seen in all directions, and even boys picking up the manifestoes.

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DURING the first days the Austrian Censorship forbade the publication of the manifestoes, and orders were issued by the police confiscating them, and threatening anyone who retained them with prosecution. After the third day, however, the papers were allowed to print the five manifestoes —"psychological bombs" some of the Vienna papers dubbed them—dropped by d'Annunzio and his daring companions.

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HUN armies on the West front have, it is now stated, since March last had their newspapers delivered regularly by aeroplane. Is this a compliment to our new propaganda methods, whereby the Allies' version of affairs would otherwise reach the Hun troops first? Some hustle on, if it is the explanation! Else, why all the hurry?

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IT'S rather a bulky fly which looms large in the ointment under the suggestion which has been submitted to the Commonwealth Government of Australia to send up aeroplanes of heavy weight-carrying capacity, loaded with powdered salt (which would be very susceptible to moisture on contact with thick cloudy mist) to scatter their contents broadcast over the thunder rain-clouds floating below, and thus cause their liquefaction, and produce rain during prolonged seasons of drought.

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THE mammoth fly in the ointment is that, according to experts, it would require a few thousand aeroplanes to do the trick. And even then, it's no "sartinty"; in fact it's a very long way off that mark.

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So the "All-Liest" has after all discovered that there *is* such a thing as International Law. Most of the World's inhabitants understood he had interned that sort of rubbish long ago. But the premier Blonde Beast has "found himself" at last, through aviation, as expressed by him in a telegram of sympathy to the Burgomaster of Frankfort over the recent air-raid. It would from this appear that "H.M. the Kaiser and King deeply sympathises in the misfortune which has befallen the open town of Frankfort as the result of the enemy air attack, *which is contrary to international law* and claimed many victims, and requests you to convey to the relatives of those who have thus fallen for the Fatherland and to the wounded the sympathy of the All-Highest."

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HELPING the Hun strikers. If the Kaiser came to ——! Mr. Ernest Pyke, whose experiences as a prisoner in Germany have made him such a virile advocate against all things Hunnish, speaking at the Grafton Galleries on Tuesday, recalled—somewhat appropriately just now—how Germany deals with strikers during the war, thusly:—

"One day a party of strikers marched past the camp. That night rows of machine-guns were trained on the road, and when the strikers returned that way, 400 of them were killed and wounded. I don't advocate such drastic measures here, but strikes like this, at a time when the British Empire is in danger, are a terrible thing to contemplate."

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IT is curious how the Hun military class mis-reads human nature, if one is to judge by the methods of conveying their Ideals. A glaring instance is afforded by *Vorwaerts*, taken from a German-owned Finnish newspaper, *Suomi-Finnland*, which publishes the following German "Soldier's Ideal," with the sole object of obtaining from the Finns active sympathy for Germans. Here we have a pen picture of the "Kultur" the Allies are out to scotch—we hope annihilate—and which the Hun apparently holds up as the acme of bliss for all humans to submit themselves to, provided the Kultur-Boss is Prussian:—

"Between the soldier and his superior officer, especially between the recruit and his superior officer, there yawns a tremendous gulf. The latter is always right, the former never. The duty of a soldier is to obey, and that of a superior officer is to command. Blindly, without reflection, the soldier must carry out the order of his superior officer. He himself can have no will or wish of his own; he is subordinated to the will of his superior officer. The soldier must not speak, he must not even think—he has merely to act in accordance with the command of his superior officer.

"The recruit is not a man; he is merely destined to become a man under the command of his superior officer . . . . He must first lie mother-naked in the dust and feel about his head the whistle of his officer's knout; only after weeks and months does his superior officer, by his grace and help, raise him up out of the dust, wash him, clothe him, and make of him a man and a soldier.

". . . . The image of the superior officer must bear not the slightest flaw—it is perfection; if the soldier imagines that he perceives a fault in him, this is merely a proof of the incompetence and incapacity of his own faculties. . . . . The officer is the soldier's Lord God. . . . . The soldier's God is never satisfied, he never returns thanks even for the best of work; but his punishment for transgression and disobedience is cruel. For in the hands of the superior officer are the keys of hell upon earth. This hell upon earth is no warm place, but it is none the less filled with wailing and gnashing of teeth. It is full of evil-smelling filth, into which the superior officer plunges the transgressor, and only when he has struggled about in it sufficiently can the superior officer allow mercy to temper justice and help him up again. And lo and behold! this evil-smelling filth has purged the wretched fellow of his sins; it has rooted out the passionate, mutinous spirit of his own will; and has transformed him into wax, soft but pure, which the superior officer can hold in his hands and knead to his heart's delight, modelling and carving it, until he produces that masterpiece, a proper, thorough, and obedient soldier."

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MANY folk would think that brakes for an aeroplane would be about as appropriate as rubber tyres for a submarine, but a resourceful American inventor, dreaming of the time when every housetop will be utilised as a landing stage, has evolved a magnetic retarding system for flying machines which, at least, has the merit of extreme originality. By the way, there exists in Philadelphia a hotel, the Bellevue-Stratford, which has a properly equipped landing platform on its roof.

Most of the schemes for arresting systems which we have seen are so positive in action that they would infallibly tip the machine nose downwards, making toothpicks of the propeller; but the new invention gets over this by constructing a landing platform of very heavy glass. Into this glass are sunk a number of electro magnets, such as are used for lifting surfaces. Beneath the transparent glass are powerful lights, so that the landing place could easily be picked out at night. The magnets would be quite large, 50 or 60 ins. across, each capable of attracting 200,000 lbs. (After all, there is nothing impracticable about this part of it, for in ship-assembly yards magnets are in use which will lift from 8 to 10 tons at contact.)

Instead of the usual wheels, the aeroplane has two armoured pontoon-like projections, and as it approaches within a few feet of the energised electro magnets the powerful attraction of the latter, partly neutralised by the flying momentum of the machine, would arrest it gently but decisively.

A bad business for the mechanic, if he happened to stray on to that energised platform with any of those iron "bachelor's buttons" embodied in his clothes!

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WE have it on the authority of the Chicago *Post* that America is to build a fleet of fast single-seater fighting planes. It is asserted that preparations are well under way, though details as to construction and tests have not as yet been made public. Previous contracts for the supply of machines of this type to the American Government, amounting to $13,000,000, had been placed in Europe. It would be interesting to know what engine is to be embodied in these little fighters on the score of manœuverability alone; the authorities can hardly be considering the Liberty motor in this connection. The same objection would apply as regards the Bugatti and the Hispano-Suiza, which are the only engines we know of as being manufactured on the grand scale in America at present. There remains only Mr. Asquith's counsel!

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WE all know the Service superstition about the third person who lights up from the one match, but the cult of the fetish is carried a great deal further than this among pilots. Often an animal is kept in camp which is regarded as a harbinger of good luck for the organisation, but more generally the luck-piece is some trifle that the aviator carries about his person—a playing card, a woolly doll worked by loving fingers, a furry Ju-Ju from a London toyshop, a piece of jade, a bracelet, or a Chinese coin. If by any chance one of these talismans miscarries the owner will enlist everyone available in the hunt, for this amiable weakness about mascots is common to all. We have even heard (tell it not in Gath) that one pilot has been seen brazenly displaying a silken scarf of ethereal lavender hue, which in a former and more placid existence had been a lady's stocking. Ah! well! *et ego in Arcadia vixi!*

INTERNATIONAL AIRCRAFT STANDARDS.

(*Continued from page* 919.)

3S38—*Specifications for Valve Forgings.*

GENERAL.—1. The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

MATERIAL.—2. The steel from which these forgings are made shall be chosen from the I.A.S.B. standard steels listed below. The composition chosen shall be stated by the manufacturer or contractor.

For exhaust valves, steel W60, W60*a*, or 51230 shall be used.

For inlet valves, steel W60*b*, X3340, or X3440 may be used and shall conform to the requirements of specification 3S8.

MANUFACTURE.—3. The forgings shall be annealed before machining or heat treating.

WORKMANSHIP AND FINISH.—4. (*a*) The forgings must be uniform in quality, free from pipes, laps, cracks, twists, and seams, and must have a workmanlike finish.

(*b*) A forging may be rejected at any time because of injurious defects or faults which are revealed by manufacturing operations, notwithstanding that it has previously passed inspection. Such rejected forgings shall be returned to the manufacturer at his expense. This clause shall not apply to forgings fabricated after export.

PHYSICAL PROPERTIES AND TESTS.—5. The forgings shall be capable of developing the following physical properties when heat treated :—

(*a*) Forgings from steels W60 or W60*a* shall show the following hardness :

Brinell hardness number	320 to 370
Shore scleroscope hardness number	53 to 65

Tensile Test.—(*b*)

	Forgings from steel—51230.		Forgings from steel—W60*b*, X3340, or X3440.	
	lbs. per sq. in.	Kilos. per sq. mm.	lbs. per sq. in.	Kilos. per sq. mm.
Minimum tensile strength	90,000	63·27	225,000	158·18
Minimum yield point	67,500	47·45	180,000	126·54
Minimum elongation in 2 inches (50·8 mm.)	18 per cent.		9 per cent.	
Minimum reduction of area ..	50 per cent.		30 per cent.	

Brinell Hardness Test.—(*c*) The Brinell hardness test shall be made after the tensile test has been met. The procedure shall be as follows : Hardness tests shall be made on the forgings selected for the tensile tests and must agree within 3 per cent. The hardness values of other forgings in the same lot must agree with the average of the values so obtained within 3 per cent.

SELECTION OF TEST SPECIMENS.—6. (*a*) Two per cent. of the forgings shall be taken for the tensile test.

(*b*) A hardness test may be required on each forging offered. At least 25 per cent of the pieces in each lot shall be tested for hardness.

(*c*) All forgings in a lot shall be heat treated at the same time, and if possible shall be from the same heat of steel.

DIMENSIONS AND TOLERANCES.—7. The forgings shall conform to the dimensions on the drawings within the tolerances specified. Surfaces which are to be machined shall admit of finishing to the required dimensions without leaving trace of original surface.

Chemical Composition of Steels.

NICKEL-CHROMIUM STEELS.

Number	Carbon	Manganese	Phosphorus, maximum	Sulphur, maximum	Nickel	Chromium
X3340 ..	0·35–0·45	0·45–0·75	0·040	0·045	2·75–3·25	0·70–0·95
X3440 ..	·35– ·45	·30– ·60	·040	·045	4·00–5·00	1·00–1 50

CHROMIUM STEEL.

51230 ..	0·20–0·40	0·50	0·035	0·035	None	11·50–14·00

TUNGSTEN STEELS.

					Chromium	Tungsten.
W60 ..	0·50–0470	0·30	0·035	0·035	3·00–4·00	13–00·15·00
W60*a* ..	·50– ·70	·30	·035	·035	3·00–4·00	16·00–18·00
W60*b* ..	·50– ·70	·30	·035	·035	·50–1·00	1·50—2·00

PACKING, SHIPPING, AND DELIVERY.—8. The forgings shall be boxed for shipment ; the gross weight of individual boxes must not exceed 220 lb. (100 kg.) gross weight.

4E1.—*Specifications for Construction of Airplane Propellers.*

GENERAL.—1. The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

MATERIALS.—2. (*a*) *Wood.*—Woods used for the manufacture of propellers for motors of more than 150 h.p., or more than 1,600 r.p.m., are to be black walnut, true mahogany, or quarter-sawed white oak.

For machines under 150 h.p., and 1,600 r.p.m., will also be allowed the use of West African mahogany, cherry, and birch. In any case, the manufacturer is not allowed to use a different material from that specified in the design without permission of purchaser.

Thickness of the boards shall be 0.75 to 1.0 in., finished.

(*b*) The laminations of the propellers being of irregular shape, imperfections are allowable on edges and parts of boards that will be cut away in the shaping of the propellers, but the stock that goes in to the propeller must be straight grain, free from curls, burls, and spiral grain, without knots, checks, dry rot, shakes, dote or other imperfections, in entire accordance with the I.A.S.B. specifications Nos. 2W3—8 for the lumber.

Sapwood is not permitted in the finished blade, and is not allowed to extend in boss more than 0.75 in. from the edge of the boss, and must in that case be sound.

(*c*) The physical properties of the wood shall be as specified in the I.A.S.B. specification No. 3W1.

(*d*) Stock shall be dried to a moisture content of 7 per cent. by methods given in the I.A.S.B. specification No. 3W2.

(*e*) The glue used shall conform to I.A.S.B. specification No. 2W2.

(*f*) Materials used for the sheathing of propellers for seaplanes may be the following :—

(1) Sheet copper in conformity to I.A.S.B. specification 3N8.

(2) Monel metal sheet in conformity to I.A.S.B. specification 3N21.

(3) Linen in conformity to I.A.S.B. specification 2F3.

(4) Cotton fabric in conformity to I.A.S.B. specification 2F4.

(*g*) The spar varnish used shall conform to I.A.S.B. specification 2V1 ; the filler, to I.A.S.B. specification 2V2. The priming varnish shall be made by dilution of spar varnish with about 2 parts of turpentine.

MANUFACTURE.—3. (*a*) Each board shall be sawed and planed in accordance with blue prints. After planing they shall be glued promptly to avoid absorption of moisture, and great care must be taken to keep the wood under uniform conditions of temperature and humidity during all the operations.

(*b*) Boards shall be balanced before glueing, and heavy ends alternated so as to minimise the effect of variation in the density of the material.

(*c*) The boards shall be sawed for glueing in such a way that the grain follows the lamination of the propeller, avoiding any cross grain. At the same time, the boards shall be so arranged that the grain comes out on the edge, avoiding any flat grain.

(*d*) The practice of glueing edge pieces on to the boards in order to fill out at the boss is forbidden, unless special permission is given by the purchaser. In case such permission is given, the lamination on both sides of the boss widener must be of the full width of the boss ; that is, no two laminations which have wideners glued to them shall be adjacent. Both the lamination and the boss widener shall be corrugated at the joint to increase the glueing surface. No splice or " dutchman " shall be permitted on the blade of the propeller. Defective joints shall not be filled with glue. The practice of glueing a thin strip of veneer to the blades will not be allowed.

(*e*) The glue room must be kept at a temperature of 90 deg. to 100 deg. F. (32 deg. to 38 deg. C.) and an average pressure in glueing of 150 lb. per square inch (0.11 kg./mm.^{2}) shall be maintained. Care shall be taken to insure an even pressure on all the parts of the glued surface for not less than 10 hours or longer, at the option of the purchaser. The pressure in the glueing process must not be removed before the expiration of 8 hours after it is completed. This period may be increased at the option of the purchaser.

(*f*) The propeller shall stand at least two days after glueing, nor shall it be finished in less than two weeks after roughing out.

(*g*) The surface of the propeller shall be smoothly sandpapered before the filler is applied, and the curvature shall be true and smooth throughout the length of the blade. Irregularities of contour are not permissible.

TOLERANCES.—4. (*a*) Propellers shall be inspected for pitch angle, alignment, blade form, and shape of section, as soon as they are finished by the manufacturer, and shall come within the following tolerance limits :

	Portion of blades more than 50 per cent. radius from axis.	Portion of blades less than 50 per cent. radius from axis.
Alignment within ..	0.0025 inch	0.0625 inch.
Error in fit of templets	0.01 × width of blade ..	0.02 × width of blade.
Width of blade ..	0.075 × width of blade	0.01 × width of blade.
Thickness of section ..	0.0625 inch	0.125 inch.

For the inner half of the blade length the deviation from the specified pitch angle shall not exceed ±1.0 deg. at any station, and the difference between the pitch angles at corresponding stations on opposite blades must not differ by more than 1.0 deg. For the outer half of the blade length the average deviation shall not exceed ±0.3 deg., the maximum deviation shall not exceed ±0.5 deg., and the difference between corresponding opposite averages and maximum shall not exceed 0.3 deg., and 0.5 deg., respectively.

(*b*) The diameter shall conform to the drawings within plus or minus 0.125 in. The inspector may accept propellers when the diameter is 0.50 in. under specified dimensions, providing not more than 1 propeller in 10 is more than 0.125 in. under the specified diameter.

(*c*) Blades on the same propeller shall be alike within the limits given above. For example, the thickness of the blade may be 0.0625 in. greater or less than specified, but two blades on the same propeller shall not differ in thickness by more than 0.0625 in.

(*d*) Propellers shall be inspected for alignment at the time of shipment and shall track within 0.0625 in. If the propeller is not over 0.315 in. out of track, it is permissible to correct the alignment by scraping the wood in the boss.

SHEATHING OF PROPELLER WITH FABRIC.—5. (*a*) Before application the fabric shall be scrubbed thoroughly with hot water and soda, and after rinsing allowed to soak in hot water for four hours in order to remove all sizing from the cloth.

(*b*) The process shall be repeated until all the sizing is removed. The cloth shall be dried and applied to the blade in the glue room, with a standard temperature of 100 deg. F.

(*c*) The blades shall be coated evenly with glue, and the cloth applied and ironed smooth, preferably with an electric iron.

(*d*) Twenty-four hours after glueing the fabric shall be given four coats of acetate dope, followed by two coats of varnish or enamel which conforms to I.A.S.B. specifications No. 2V1.

SHEATHING OF PROPELLERS WITH COPPER OR NAVAL BRASS.—6. (*a*) Metal sheathing shall be set in flush with the blade. Rivets of the same material as the sheathing shall be spaced over the area of the sheathing. They shall be applied in such a way as to fit tightly without splitting the wood and shall be applied alternately from the face and the back. The rivets shall then be headed and filed to form a smooth surface. No rivets shall be driven closer than 1 in. from the propeller edge, except at the edge of the metal or in very small blades.

(*b*) A row of rivets about 0.625 in. apart shall be spaced along the edge of the sheathing.

(*c*) The rivets shall not exceed 0.085 in. in diameter and shall show a breaking load of at least 130 lb. (58.9 kg.) at the riveted end and 180 lb. (81.5 kg.) at the head end. The working stress due to centrifugal force shall not exceed 4,266 lb. per square inch (3 kg./mm.^{2}).

(*d*) Sheathing shall be formed to the exact shape of the blade before any rivets are placed.

(*e*) The rivets shall be applied in such a way that they do not follow the line of the grain.

(*f*) When the work is complete the tip shall fit snugly against the wood. Buckling or lifting of the metal shall be considered ground for rejection.

(*g*) Sheathing shall be perforated at the extreme tip by four holes 0.0625 to 0.0938 in. in diameter, to allow the moisture to be removed.

FINISHING OF PROPELLERS.—7. Propellers shall be finished by the application of 1 coat filler, 2 coats priming varnish, and 3 coats of spar varnish. Each coat should be allowed sufficient time to dry before the application of the next coat.

BALANCING OF PROPELLERS.—8. (*a*) The propellers shall be tested for balance after the shaping, and after each subsequent operation which effects the balance. For this test the propeller shall be mounted so that it can turn on a horizontal axis, and the sensitiveness of the mounting must be such that it will move at the application of 1 gram (equals 0.036 oz.) at a distance of 2 ft. (61 cm.) from the axis.

(*b*) The balancing shall be done in a room free from air currents.

(*c*) The propeller when completed shall stand on the balancing machine in any position without persistent motion in any direction.

TESTING OF PROPELLERS.—9. (*a*) One propeller of each new design shall be tested by running for at least 10 hours at rated speed on the engines for which it was designed.

(*b*) A centrifugal test of at least 1 hour duration shall be run at a speed of 10 per cent. in excess of the rated speed. This test applies to one propeller of each new or of each unconventional design and to propellers made by inexperienced builders.

(*c*) The deflection of the tip in an axial direction shall not exceed 0.75 in. when the propeller is turning in free air at the rated speed unless greater deflection is an intended feature of the design. This requirement applies to propellers having a diameter of less than 10 ft. (3.05 m.).

(*d*) Such additional tests as may be desired shall be stipulated for propellers of untried materials or of radical design, or larger than 10 ft.

HUBBING OF PROPELLERS.—10. (*a*) The large boss hole shall be bored before roughing and shaping in order to insure perfect alignment.

(*b*) The fit of the hub in the large hole shall be neat and close, and the metal flange shall not show perceptible shake. The fit of the bolts in the wood shall be as tight as possible without danger of splitting the wood.

MARKING OF PROPELLERS.—11. (*a*) The propellers shall be stamped in such a position on the boss as to be legible after the placing of the metal flange, with the following information :—(1) Pitch, (2) diameter, (3) safe revolutions per minute, (4) whether right or left hand, and (5) serial number.

(*b*) On the blade shall be the manufacturer's trade-mark or name.

(*To be continued.*)

French Honour for U.S. Ace.

IT is announced in the *Journal Officiel* that the French Military Medal has been conferred upon Sergeant David Putman, an American airman, who recently attacked single-handed an enemy patrol of eight aeroplanes and brought down two of them, bringing his total of aerial victories up to 10.

A Protest by Holland.

A MESSAGE from The Hague states that the Dutch Minister in London has been instructed to protest against an alleged violation of Dutch territory by British aeroplanes on July 16th.

Aerial Posts in France.

"A POSTAL service by air has been started for the first time in France between Paris and St. Nazaire," says the *Daily Telegraph* correspondent in Paris, writing on August 18th. "Aeroplanes, carrying mails, left Le Bourget Aerodrome, near Paris, shortly after 10, and one of the two machines, the other having had an accident, reached St. Nazaire at 8.30 p.m., after a stoppage at Le Mans. The total distance from Paris to St. Nazaire is some 250 miles. This air service will shortly become regular and daily, and a Paris-Nice aerial postal service may soon be started with a possible continuation to Rome. The aeroplanes used are machines which, though quite efficient for this service, are out of date for military use at the front. The pilots are also men who can no longer be of service at the front. For instance, one is a sergeant-major who has already been 10 times wounded in action, and another is a sergeant who escaped from Germany, where he was a prisoner of war. When the aerial postal service becomes regular, the extra charge for letters by it will be 7½*d.* per letter."

Aerial Mails in Australia.

THE statement attributed to Mr. Webster, Australian Postmaster-General, that postal air services in Australia are impracticable financially has led a Sydney business man, Mr. C. W. Chateau, to offer to find the capital within four months for a Melbourne-Sydney service if Mr. Webster will guarantee one ton of letters daily.

America's Contribution in Engines.

ENTERTAINING the representatives of the Overseas Press, now visiting England, in Printing House Square on August 16th, Lord Northcliffe, in speaking of America's contribution to the war, said :—

"Let me take the question of air engines alone. I believe that air engines will largely help to end the war. Not the combined output of Germany and Austria, not the whole of the British Empire, has the same possibility of quantity production in such matters as air engines as the United States. One of the men who is making these air engines, only one of many, actually produces every day 3,200 motor-cars. The Americans, after certain troubles that we have all had, have now produced their wonderful Liberty motor. I don't know how many thousands will be produced each month. But we shall be told what they do produce. The Americans are fighting a public war, not a secret war. (Cheers.) If I estimate that they can produce 10,000 a month, I do so after having visited a great many places where they are made."

Personals

Casualties.

Lieut. ARTHUR CHARLES SOTHERON ESTCOURT, M.C., R.A.F., who was killed in action on August 8th, aged 24, was the youngest son of the Rev. E. W. Sotheron Estcourt, of Estcourt, Glos., and Rector of Long Newnton, Wilts.

Lieut. RICHARD STONE, pilot, R.A.F., who was killed in action on August 9th, aged 19, was the younger son of John M. Stone, of Lincoln's Inn, and Beaconsfield (formerly of Blackheath, S.E.).

Observer Lieutenant ROBERT E. HORTON, R.A.F., who died on August 12th from injuries received whilst flying on patrol duty, aged 20, was the son of Mrs. Horton and grandson of T. E. Marshall, of Selhurst, Frinton, Essex.

Maj. REGINALD JOHN LOWCOCK, D.S.O., M.C., Sherwood Foresters and R.A.F., who was accidently killed on July 22nd, was 21 years of age. He left college when the war broke out, and went to Sandhurst. From there he was gazetted to the Notts. and Derby Regiment, and later to the R.F.C. After training for a pilot he went to France in June, 1916, was gazetted Captain in December of the same year, and was wounded in April, 1917. He did some excellent work as an artillery co-operation pilot, and received the D.S.O. in July, 1917, also being mentioned in despatches. He was wounded a second time, and returned to England in September, 1917, was decorated by the King on November 7th, 1917, and was gazetted Major in January, 1918.

Lieut. RODERICK OSWALD CORDEROY MACDONALD, M.C., R.F.A., attached R.A.F., who was accidentally killed while flying on August 10th, was the elder son of the late Dr. Roderick Macdonald, of China, and of Mrs. Macdonald, of Edinburgh, and was educated at the Royal High School and University, Edinburgh, where he gained his B certificate in the University O.T.C. He received his commission in the R.F.A. on September 4th, 1914, and landed with the 29th Division in Gallipoli in March, 1915, serving later with the artillery in France, where he won the M.C. at the battle of the Somme in July, 1916. In March, 1917, he volunteered as an observer in the R.F.C., and served in that capacity for eight months in France, being sent to Egypt later to qualify as pilot. After being gazetted as pilot he returned to this country for some special instruction, and fell when engaged in aerial photography. He had been recommended by the late Lord Roberts for the Consular service, and had been accepted by the Board of Selection.

Lieut. FRANCIS CYRIL CHURCHILL MANLEY, R.A.F., who was killed on August 11th as the result of an accident, aged 21, was the elder son of Francis Churchill and Florence Manley, of Holmsleigh, Hessle, East Yorks.

Lieut. THOMAS STUART NASH, R.A.S., who died of wounds on August 8th, was the elder son of the Reverend and Mrs. Cecil Nash, The Parsonage, Kincardine O'Neil, Aberdeenshire.

Sec. Lieut. CLAUDE JOHN HOWARD RAWLINGS, who was killed on August 12th in a flying accident in an eastern county, aged 21, was the eldest son of Mr. and Mrs. S. J. Rawlings, of Bloomfield Avenue, Bath. He was educated at Clifton and at Weston-super-Mare, and enlisted when only 17 in the 4th Gloucestershire Regiment. He was invalided home with trench fever, and in January was transferred to a flying unit. A letter received by his parents the day before his death stated that he had passed all his tests and secured his commission. He was coming home this week on four days' "graduation leave." When flying on Monday his machine nose-dived and crashed to the ground, and Mr. Rawlings was killed. He was buried at Bath Abbey Cemetery.

Capt. WILLIAM BARRIE YOUNG, R.A.F., who has been accidentally killed while flying, was the only son of Dr. and Mrs. Young, of Earlston, Berwickshire. He was educated at Edinburgh Academy, and joined the ranks of a Scottish Yeomanry regiment on the outbreak of war, and served with them at Salonica. Later obtaining a commission in the Air Force, he was severely wounded during an air fight in France in 1916. He had recently been engaged as instructor at the station where he was killed.

Missing.

Any information relating to Sec. Lieut. H. S. HENNESSEY, R.A.F., reported missing June 5th, would be gratefully received by N/S.O.C. Whitby, No. 2 Canadian General Hospital, B.E.F., France.

Married.

Capt. EDWARD D. ATKINSON, D.F.C., R.A.F., son of the late J. H. Atkinson, of Calcutta, was married on August 14th at the Old Parish Church, Ayr, to NANCY, second daughter of Mr. and Mrs. DAVID ROWAN, Dunskaig, Ayr, Scotland.

Capt. DOUGLAS C. M. BROOKS, M.C., R.A.F., third son of Mr. Alfred Brooks, Langdon Hills, Essex, was married on August 13th at Holy Trinity Church, High Hurstwood, Sussex, to BERYL, only daughter of Mr. HERBERT ANDERSON, Hermitage Farm, High Hurstwood.

Capt. E. E. N. BURNEY, M.C., The Royal Berkshire Regt. and R.A.F., only son of the late Colonel E. H. Burney, C.B., Royal Berkshire Regiment, and Mrs. Burney, was married on August 14th at the Brompton Oratory, to SYBIL IVY, daughter of Mr. and Mrs. C. M. MOORE, of Claygate, Surrey.

Lieut. RALPH NORMAN MAWER, Suffolk Regt., R.A.F., third son of the late Harry Mawer and Mrs. Mawer, 15, Cheniston Gardens, W., was married on August 17th at St. Mary-the-Virgin's, Ardleigh, to ESME ALEXANDRA, younger daughter of the late Lieut.-Col. A. C. BENNETT, D.S.O., West Yorkshire Regiment., and Mrs. Bennett, Ardleigh Park, Essex.

Capt. WILLIAM VAZIE SIMONS, R.A.F., was married on August 7th, at South Woodford, to MADELINE (MADGE) MARY GROSS, of "Normanhurst," South Woodford, Essex.

Capt. W. EDWARD SMITH, R.A.F., younger son of Mr. and Mrs. Edward Smith, of Leamington was married quietly on August 21st at Solihull Church, to OLIVE MERLE NICKSON, eder daughter of Mr. and Mrs. H. W. Nickson, of Solihull, Warwickshire.

To be Married.

A marriage has been arranged, and will take place on September 16th, between Flight-Commander A. PELHAM MACKILLIGIN and VIOLET, younger daughter of Capt. LANCELOT BATHURST, R.A.M.C., and Mrs. Lancelot Bathurst, Ellesmere, Shropshire.

The marriage arranged between Lieut. RAWDON S. PAYNE, R.A.F., and Miss SYLVIA HARVEY, will take place at St. Paul's Church, Knightsbridge, on Thursday, August 29th, at 2 p.m. No invitations will be issued, but all friends will be welcome at the church and afterwards at 38, Rutland Gate.

Items.

It was announced in the *Court Circular* dated Windsor Castle, August 16th, that Lieut.-Col. C. E. H. RATHBORNE, R.A.F., had the honour of being received by His Majesty.

How Lieutenant Loewenhardt Died.

FROM a report in the *Cologne Gazette* it appears that Lieut. Loewenhardt, the crack German pilot, was accidentally killed in a collision with another German machine while engaged in a fight with a British one-seater.

The Kaiser telegraphed to Loewenhardt's mother: "To my greatest sorrow I have received news of the death of your heroic son, the brave leader of the tenth group of Richthofen's squadron. A smart, keen air officer, it was granted him to accomplish great deeds of prowess."

Another Noted German Pilot Dead.

AIRMAN-LIEUT. PUETTER, who had been decorated with the Ordre Pour le Merite, and credited with 25 victories, has died of wounds received in falling from his machine, which was on fire.

Argentina Wanting Aeroplanes.

THE Republic of Argentina has always displayed a desire to keep its fighting forces up to date, and it is not surprising to learn that the Government has laid before the Chamber a Bill asking for £16,000,000 for the purchase of warships, submarines, aeroplanes and merchant vessels.

Aeroplanes and Tramway Cables.

AN aeroplane alighting at Marseilles owing to engine trouble struck one of the tramway cables, causing a fusion, which set on fire two cars which were approaching. Four passengers were killed and several injured, while the two airmen were seriously burnt.

FLIGHT

THE ROYAL AIR FORCE

London Gazette, August 13th.

The following temporary appointments are made at the Air Ministry :—

Staff Officer, 2nd Class.—Capt. A. J. Hurst, and to be Temp. Maj. whilst so employed ; July 1st.

Staff Officer, 3rd Class.—Lieut. (Temp. Capt.) H. S. Neville, and to retain his temp. rank whilst so employed ; May 27th.

The following temporary appointments are made :—

Staff Officers, 2nd Class.—And to be Temp. Majs. whilst so employed :—Capt. G. B. Fraser ; April 1st. L. L. Batten (Capt., Glouc. Yeo., T.F.), and is granted a temp. commn. as Capt. ; April 8th. Capt. K. B. Harbord, vice Capt. (Hon. Maj.) N. M. Martin ; July 29th.

Flying Branch.

Captains to be Temporary Majors whilst employed as Majors (A.) :—M. Henderson, D.S.O. ; April 1st. H. J. Payn ; July 15th. W. E. Young, D.F.C. ; Aug. 4th.

Lieutenants (Temporary Captains) to be Temporary Majors whilst employed as Majors (A.) :—F. A. Bates, M.C. ; July 26th. H. M. Probyn, D.S.O. ; July 28th. D. Cloete, M.C. ; Aug. 2nd.

Lieut. (Temp. Capt.) P. G. N. Ommanney to be Temp. Maj. whilst employed as Maj. (Dir.) ; June 8th.

Lieut. (Hon. Capt.) W. H. S. Aplin to be Temp. Maj., but without pay and allowances of that rank while specially employed ; Aug. 14th.

Lieut. N. G. Fraser to be Temp. Capt., but without pay and allowances of that rank, while specially employed ; Aug. 14th.

Lieutenants to be Temporary Captains while employed as Captains (A.) :—C. H. Sands ; April 20th. C. H. Russell ; June 6th. J. Mackereth ; July 14th. F. H. St. C. Sargant ; July 21st. J. Cottle ; July 29th. J. M. Glaisher, A. S. Hemming ; July 30th. E. Burney, M.C., I. F. Hind ; Aug. 1st. B. Ankers, D.C.M., T. Roberts ; Aug. 2nd. B. Roxburgh-Smith ; Aug. 4th. R. Manzer ; Aug. 7th.

Lieutenants (Hon. Captains) to be Temporary Captains while employed as Captains (A) :—J. R. Swanston ; July 25th. N. Senior ; Aug. 1st. D. R. Bavlis, G. Preen ; Aug. 5th.

Lieut. (Hon. Capt.) V. R. Scriven to be Temp. Capt. while employed as Capt. (S.) ; July 17th.

B. A. Wilson (Lieut., Brit. Columbia R., C.E.F.) is granted temp. commn. as Sec. Lieut. (A. and S.) and to be Hon. Lieut. ; May 25th. (Substituted for notification in *Gazette*, June 28th.)

W. E. Surman is granted a temp. commn. as Sec. Lieut. (A. and S.) ; Aug. 5th. The following Flight Cadets are granted temp. commns. as Sec. Lieuts. (A. and S.) :—E. G. Smith ; May 29th. W. W. Van Blaricom ; June 15th. F. B. Whittle ; June 27th. A. E. Alderslade, L. R. Blacking, J. A. Bell ; July 11th. D. J. Avery, R. A. Molin ; July 29th. F. Carroll, T. G. Hoskins ; July 31st.

The following Flight Cadets are granted temporary commissions as Second Lieutenants (Observer Officers) :—C. N. Yelverton, A. E. Griffiths, G. W. Fields, H. Broadberry ; July 26th. B. C. Cotter ; July 28th. A. C. Stevenson, C. Volk, A. G. Wyatt, W. G. A. Bird, H. A. St. G. Burge, K. J. Cadwallader, W. Galloway, A. G. Harris, A. F. Grant, E. Coult, J. Ll. Marshall, E. A. Hooper, A. R. Sabey, J. M. S. Macpherson ; Aug. 1st. W. J. N. Challin, H. Davies, R. F. Chapman ; Aug. 3rd. H. Clarke, L. G. Gillam. R. M. Foulton ; Aug. 7th. B. Troth, M. E. V. Hill, W. Glew, C. Fortune ; Aug. 9th. F. Collins, T. J. Calmon, H. J. Andrews, W. M. W. Ayles, L. Anstiss, R. Alcock, W. G. Brown, G. E. M. Browne, A. H. Bell, H. H. Bland, G. C. Charlton, R. E. Clark, H. J. Clements, E. E. Davis, W. L. Dowd, H. P. Flack, H. A. Felton, W. A. Ford, C. R. Fenwicke, C. Holborn, G. A. McGillivray ; Aug. 10th. A. Camp, D. R. Hoon, G. A. R. Gregory, P. James, H. J. C. Elwig, R. Nicklin ; Aug. 12th.

The following are granted temporary commissions as Second Lieutenants (Observer Officers) :—H. A. Wessels (Sec. Lieut., E. Yorks R.), H. Etterley (Temp. Sec. Lieut., K. R. Rif. C.), H. S. Maxwell (Sec. Lieut., attd. R. W. Surr. R.), G. N. Dixon (Sec. Lieut., E. Yorks R., S.R.) ; Aug. 8th. A. R. C. Lett (Temp. Lieut., E. Lanc. R., attd.), and to be Hon. Lieut., T. E. Greer (Lieut., Sask. R., C.E.F.), and to be Hon. Lieut., F. C. Kent (Lieut., Sask. R., C.E.F.), and to be Hon. Lieut. ; Aug. 12th.

The following Chief Petty Officers (R.N.A.S.) are granted temporary commissions as Second Lieutenants (Observer Officers) :—N. S. Calder, H. T. Sayer ; June 22nd. W. J. Harris, E. A. Homer ; July 27th.

The following Petty Officers (R.N.A.S.) are granted temporary commissions as Second Lieutenants (Observer Officers) :—R. Connor, F. T. Eades, T. B. Thomson, June 22nd.

The following Sig. Bo'sns (R.N.) are granted temporary commissions as Second Lieutenants (Observer Officers) :—F. W. Foster, G. R. D. Goadsby ; July 27th.

The following Yeomen of Signals (R.N.) are granted temporary commissions as Second Lieutenants (Observer Officers) :—A. B. Ball, J. B. V. Glyde, T. W. Hayes, F. C. Jenner, J. B. Prouse, W. S. J. Walne ; July 27th.

The following Leading Signalmen (R.N.) are granted temporary commissions as Sec. Lieuts. (Observer Officers) :—C. V. Brealy, A. J. Redman ; July 27th.

The following relinquish their commissions on ceasing to be employed :—Lieut. (Hon. Capt.) C. B. Wainwright (Capt., R.F.A.) ; July 25th. Lieut. (Hon. Capt.) R. P. L. Cochrane (Capt., I.A.) ; Aug. 1st.

The following Lieutenants resign their commissions to resume their medical studies, and are granted the hon. rank of Lieutenant :—N. McL. Craig, I. H. McClure, G. R. Nodwell ; Aug. 14th.

Lieut. W. S. Walker relinquishes his commission on account of ill-health contracted on active service, and is granted the hon. rank of Lieut. ; Aug. 14th.

Lieut. C. F. Linton resigns his commission ; Aug. 14th.

The following Second Lieutenants resign their commissions, having been found permanently unfit for further instruction as Pilots or Observers :—B. Benzies, S. H. Baynes, A. E. Hunt, R. N. Pick, S. C. Millett ; Aug. 14th.

The Christian names of Hubert Frederick Walker are as now stated, and not Harry, as in *Gazette*, July 9th.

The Christian names of Franklin Rice Reid are as now stated, and not R. F., as in *Gazette*, July 16th.

The surname of Sec. Lieut. M. P. E. Harrisson (E. Kent R.) is as now stated, and not as in *Gazette*, June 7th.

The notification in *Gazette*, June 11th, regarding Sec. Lieut. F. S. Hall is cancelled.

Administrative Branch.

The following are granted temporary commissions as Lieutenants :—T. G. Horn (Capt., York and Lanc. R.), and to be Hon. Capt. ; June 3rd. J. A. Heather (Qrmr. and Hon. Lieut., T.F. Res.) ; June 14th. A. de M. Bellairs (Temp. Lieut., Spec. List) ; July 18th. T. F. Flood (Qrmr. and Hon. Capt., A.V.C.) and to be Hon. Capt. ; Aug. 1st.

Lieutenants (A. and S.) to be Lieutenants :—(Hon. Capt.) T. W. M. Cameron ; May 7th. F. M. Johnson ; June 13th. J. C. Cantrell ; July 30th. Lieut. C. T. Richards to be Lieut., from (O.) ; Aug. 2nd. Sec. Lieut. J. C. Holmes to be Temp. Lieut. while employed as Lieut. ; July 17th.

The following are granted temporary commissions as Second Lieutenants :—W. B. Fredericks ; July 1st. W. H. Hills (late Lieut., R.A.M.C.) and to be Hon. Lieut. ; July 26th. F. Allanson, F. Anderson, B. J. Beech, W. Best, J. E. W. Billings, W. T. Daniell, H. W. Davidson, E. G. Davison, T. Gregory, E. Hennen, D. A. Henning, J. S. Hill, A. R. H. Hora, J. E. Hetherington, H. Hayter, W. P. Hotson, H. E. Ilott, J. H. Jones, A. G. J. Littlewood, E. J. Newman, J. Parsons, O. B. Paton, E. J. Peek, J. J. Shuley, R. G. L. Simpson, E. J. Slee, R. W. Stevenson, W. R. Smith, F. H. Stapleton, W. C. G. Stokes, A. W. Toms, A. S. Wall, G. C. Wilson, J. W. A. Wymark ; Aug. 4th. A. H. Durand ; Aug. 7th. A. G. Allan, R. D. Cheveley, W. D. Cooney, J. W. Corble, L. de B. Lewis, H. J. Neill, P. C. Barratt, W. Cox, H. G. Hawkes, L. Henri, J. Pritchard, J. Nairn, H. D. Chalke, D. T. Garland, H. W. Turton, R. L. Croucher, R. W. Banks (late Qrmr. and Hon. Lieut., W. Yorks R., T.F.), and to be Hon. Lieut. ; Aug. 10th.

The following Sec. Lieuts. relinquish their commissions on account of ill-health, and are granted the hon. rank of Sec. Lieut. :—W. S. S. Rawson, H. B. S. Reeve ; Aug. 14th.

The following Sec. Lieuts. resign their commissions :—W. F. Hooper, P. F. Parton ; Aug. 14th.

The notifications in *Gazette* July 30th and Aug. 9th concerning Lieut. G. W. Panter are cancelled.

The surname of Lieut. (Temp. Capt.) T. D. S. Purdey is as now described, and not as in *Gazette*, July 9th.

Technical Branch.

Substituted for notification in *Gazette*, Aug. 6th :—

The following are granted temporary commissions as Lieut.-Cols. :—B. H. O. Armstrong (Maj., Bt. Lieut.-Col., R.E.) ; R. A. Kingscote (Temp. Lieut.-Col. R.E.) ; April 1st.

A. Struben (late Maj., Gen. List) is granted a temp. commission as Maj. ; April 1st.

The following Temp. Capts., R.E., are granted temporary commissions as Capts. :—W. A. Daft, J. F. Hawkins, and to be Temp. Maj. whilst so employed : H. T. Humfress, A. M. Taylor, G. Waddell, and to be Temp. Maj. whilst so employed ; April 1st. G. C. Milnes, M.C. (Capt., York. and Lanc. R.), is granted a temporary commission as Capt. ; April 1st.

The following Temp. Lieuts., R.E., are granted temporary commissions as Lieuts. :—H. Hooper, J. A. V. Welsh ; April 1st.

W. B. Close (Temp. Sec. Lieut., R.E.) is granted a temporary commission as Sec. Lieut. ; April 1st.

Capt. (Temp. Maj.) A. K. Hall to be Temp. Lieut.-Col. whilst employed as Lieut.-Col. ; May 1st.

To be Temp. Capts. whilst employed as Captains :—Sec. Lieut. A. E. Fincher ; July 1st. Sec. Lieut. W. Cole ; July 29th. Lieut. G. A. Harrison ; July 30th.

Lieuts. (A. and S.) to be Lieuts. :—N. B. Harris ; May 5th. E. D. Bonisteel ; June 16th.

Second Lieutenants to be Temporary Lieutenants whilst employed as Lieuts. : J. W. Jean ; July 29th. (Hon. Lieut.) J. L. Miles ; Aug. 1st.

Medical Branch.

A. P. Woollright (late Capt., R.A.M.C.) is granted a temporary commission as Captain ; Aug. 12th.

The following are granted temporary commissions as Lieutenants :—G. F. H. Bloom ; Aug. 10th. H. B. B. Greene ; Aug. 12th.

Memoranda.

Sir W. R. Lawrence, Bt., G.C.I.E., C.B. (Col., Spec. List), is granted a temporary commission as Maj., and to be Hon. Col. ; July 4th.

Capt. E. A. Ewart to be Temp. Maj. whilst employed at the Ministry of Munitions : April 1st.

Temp. Hon Lieut. W. E. Guttentag to be Temp. Hon. Capt. ; Aug. 1st.

London Gazette, August 16th.

The following temp. appointments are made at the Air Ministry :—

Staff Officers, 1st Class.—C. M. Robertson (Hon. Lieut.-Col. in Army), and is granted a temp. commission as Lieut.-Col. ; May 20th.

Staff Officers, 2nd Class.—W. A. Hunter (Lieut., Gen. List) is granted a temp. commission as Lieut., and to be Temp. Maj. whilst so employed ; June 21st.

Staff Officers, 3rd Class.—And to be Temp. Capts. whilst so employed, if not already holding that rank :—Capt. Hon. A. O. Crichton, *vice* Lieut. (Temp. Capt.) A. McR. Moffatt ; July 17th. Capt. R. A. B. Orlebar ; July 20th. Lieut. P. J. Cayley, *vice* Lieut. (Temp. Capt.) L. H. Jefferson ; July 24th. Lieut. G. C. Wingrove, *vice* Capt. Hon. G. St. J. Brodrick ; Aug. 4th.

The following temp. appointments are made :—

Staff Officer, 2nd Class.—Capt. Hon. J. H. B. Rodney, M.C., and to be Temp. Maj. whilst so employed ; July 2nd.

The notification in *Gazette*, Aug. 6th, regarding Capt. (Temp. Maj.) C. S. Macnab, is cancelled.

Staff Officer, 3rd Class.—Lieut. J. C. Barraclough, and to be Temp. Capt. whilst so employed ; July 8th.

The date of the appointment of Lieut. (Temp. Capt.) L. Tunks is April 1st, and not as in *Gazette* June 7th.

Flying Branch.

Maj. L. Tomkinson to be Temp. Lieut.-Col. whilst employed as Lieut.-Col. (A. and S.) ; July 17th.

Lieuts., to be Temp. Capts. whilst employed as Capts. (A.) :—(Hon. Capt.) H. J. Wiser ; July 18th. G. F. Knight, G. Ross-Soden, J. D. Seal, (Hon. Capt.) H. E. P. Wigglesworth, D.S.C., W. F. Williamson ; Aug. 1st. A. C. Heaven M.C. ; Aug. 3rd. W. K. R. Liddell ; Aug. 4th. F. McQuistan ; Aug. 9th. C. E. Pither, S. L. Pope ; Aug. 10th. W. Halford ; Aug. 11th.

Lieut. (Hon. Capt.) D. M. Ballantyne to be Temp. Capt. whilst employed as Capt. (A. and S.) ; Aug. 6th.

The following Flight Cadets are granted temp. commissions as Sec. Lieuts. (A.) :—C. Alexander, D. H. Alexander, G. H. Alexander, L. Ashton, J. Berry, E. R. Cornell, W. Cowan, H. L. Cullen, L. P. Curley, D. A. L. Curtis, M. H. Davis, D. Dobbins, J. U. Eddy, J. F. C. Fisher, E. T. Hamilton, H. Heard, W. H. Hellier, G. Hughes, J. J. H. Hyde, H. N. Hyslop, T. Irtuganoff, J. R. Kirby, G. H. P. Knowler, M. G. Larder, W. M. Laughton, E. Lofquist, J. McColl, C. K. McDougall, C. E. McKeen, H. S. McClelland, J. E. Manson, E. C. Mathews, H. M. Mosley, J. H. L. Newby, T. R. Nichols, R. T. Norton, C. J. O'Connor, B. J. P. O'Day, H. W. Pepper, T. C. Porteous, H. Ll. Pursel, L. W. Pusey, A. Rankine, K. C. Rappell, H. L. Rigby, A. R. Ross, G. P. Seeley, H. T. Singleton, A. C. Smedley, D. A. Stenhouse, G. W. Tisdale, E. A. Turner, C. H. Wood, T. C. Blencowe ; July 11th.

P. F. O. P. V. Tempest (late R.N.A.S.) is granted a temp. commission as Sec. Lieut. (A. and S.) ; May 5th.

Flight Cadet G. A. Shelley is granted a temp. commission as Sec. Lieut. (A. and S.) ; June 21st.

Sec. Lieut. T. A. Dickinson (late Gen. List, R.F.C., on prob.) is confirmed in

his rank as Sec. Lieut. (A. and S.); May 4th. (Substituted for notification in *Gazette*, July 5th.)

W. E. Purdin is granted a temp. commission as Sec. Lieut. (A. and S.); Aug. 14th.

The following Flight Cadets are granted temp. commissions as Sec. Lieuts. (A. and S.):—H. W. Clark, C. Norton; July 30th. W. G. Pearson, H. N. Jubb, M. J. Ward, N. Greaves; July 31st. A. Fletcher; Aug. 1st. E. F. Nicholson, W. B. Esplen; Aug. 3rd.

H. J. Collins (Lieut., Yorks. Hussars Yeo., T.F.) is granted a temp. commission as Sec. Lieut. (Observer Officer), and to be Hon. Lieut.; April 11th.

The following Flight Cadets are granted temp. commissions as Sec. Lieuts. (Observation Officers):—A. R. Maggs; July 12th. J. E. Foden, B. Chadwick, H. Holmes, R. Fittes, R. Gillin, H. Hollings, J. F. Cavanagh, J. S Nichols; Aug. 10th.

Lieut. C. J. G. Wallace (Temp. Lieut., N'land Fus.) relinquishes his commission on ceasing to be employed; May 13th.

The following Lieuts. resign their commissions to resume their medical studies, and are granted the hon. rank of Lieut.:—E. N. Chamberlain, N. P. Henderson; Aug. 17th.

Lieut. W. J. Paull relinquishes his commission, and is granted the hon. rank of Lieut.; Aug. 17th.

Lieut. T. Ure relinquishes his commission on account of ill-health contracted on active service; Aug. 17th.

Sec. Lieut. E. H. Bishop relinquishes his commission on account of ill-health, and is granted the hon. rank of Sec. Lieut.; Aug. 17th.

Lieut. C. R. Henderson relinquishes his commission, having been found permanently unfit for further instruction as Pilot or Observer; Aug. 17th.

The following Sec. Lieuts. relinquish their commissions, having been found permanently unfit for further instruction as Pilots or Observers:—D. Davis, A. C. Morris, A. S. Quick; Aug. 17th.

The date of appointment of Lieut. C. H. O. Strettell as Temp. Capt. (K.B.) is Aug. 7th, and not as stated in *Gazette* Aug. 9th.

The notification in *Gazette* June 18th regarding Sec. Lieut. W. C. Ryder is cancelled.

The initials of Sec. Lieut. R. E. Hodgson (L'pool R.) are as now stated, and not as in *Gazette* July 19th.

The surname of Flight Cadet Charles James Arthur Guymer is as now stated, and not as in *Gazette* July 30th.

The notifications in *Gazette* Aug. 6th, with reference to the following Flight Cadets, are cancelled:—A. D. Cherry, J. R. Lofthouse.

The initials and surname of Sec. Lieut. R. A. Foggin are as now described and not as in *Gazette* July 12th, describing him as Sec. Lieut. A. Faggin.

The notification in *Gazette* July 30th regarding Sec. Lieut. J. A. King is cancelled.

The notification in *Gazette* Aug. 2nd regarding Lieut. (Temp. Capt.) R. J. Elliott is cancelled.

Administrative Branch.

C. P. Foley (Temp. Lieut.-Col., Spec. List) is granted a temp. commission as Maj., and to be Hon. Lieut.-Col.; April 1st.

Lieuts. to be Temp. Capts. while employed as Capts.:—G. W. Panter from (O.) April 3rd. H. G. Bellamy; July 11th. S. McLaughlin; July 17th. E. Porter, D.C.M.; July 23rd. (Hon. Capt.) C. W. Banks, F. R. Wilkins; Aug. 1st.

Sec. Lieut. W. A. Glasper to be Temp. Capt. while employed as Capt.; Aug. 7th.

The following are granted temp. commisions as Lieuts.:—W. W. Honywood, M.C. (Lieut., Lrs.), W. A. Woodward (Lieut., R.F.A., S.R.); May 11th. P. L. Hogan (Lieut., L'pool R.); May 15th. H. Tilley (Lieut., Dur. L.I.); June 1st. S. W. Southwood (Temp. Capt., Durh. L.I.), and to be Hon. Capt.; July 6th. G. Johnstone (Temp. Lieut., attd. R. Scot. Fus.); July 8th. G. J. Elliott (Qrmr. and Hon. Capt., New Armies), and to be Hon. Capt.; July 12th. A. D. F. Mackenzie (Temp. Capt., A.P.D.), and to be Hon. Capt.; July 16th. K. G. Sampson (Temp. Lieut., A.S.C.); July 17th. H. J. S. Quarterman (Lieut. E. Kent R.); July 19th. C. A. J. Manger (Lieut., A. and S. Highrs.), W. A. J. Mitchell (Lieut., R.G.A., T.F.); July 26th. J. T. Shaw (Qrmr. and Hon. Lieut., R.E.); July 27th. H. T. L. Brittain (Temp. Lieut., Worc. R.); July 29th. G. T. Addis (Capt., R. Dub. Fus., S.R.), and to be Hon. Capt.; July 31st.

W. F. Duff is granted a temp. commission as Lieut.; Aug. 6th. (Substituted for notification in *Gazette* Aug. 9th.)

Lieuts. (A. and S.) to be Lieuts.:—T. J. Gillow; Aug. 7th. N. J. Wenger; Aug. 8th.

Sec. Lieuts. to be Temp. Lieuts while employed as Lieuts.:—B. S. Higgs; May 1st. W. J. Bray; May 31st. W. J. Brooks; June 20th. J. Burden, H. S. Lewin, P. H. Paul, A. G. Ridgon, H. J Skingle; Aug. 1st.

Sec. Lieuts. (late Gen. List, R.F.C., on prob.) are confirmed in their rank as Sec. Lieuts.:—M. Sheriff, D.C.M.; April 1st. (Substituted for notice in *Gazette* July 3rd.) F. G. Simpkins; May 29th. F. G. A. Terrill, J. M. Russell; June 7th. Sec. Lieut. R. McK. Colvill; July 1st.

Sec. Lieut. R. F. Hyett (late R.F.C., Spec. Res., on prob.) is confirmed in his rank as Temp. Sec. Lieut.; Aug. 2nd.

The following are granted temp. commissions as Sec. Lieuts.:—C. W. Saggs (Qrmr. and Hon. Lieut. A.V.C.), and to be Hon. Lieut.; May 1st. G. M. Ashmore (Temp. Lieut., attd. Hamps. R.), and to be Hon. Lieut., J. Martin (Temp. Lieut., M.G.C.), and to be Hon. Lieut.; June 7th. H. J. Bateman, W. R. Wolsey; July 1st. B. E. Drane; Aug. 10th. H. H. Coffin, F. Dallow, H. V. Lawley, H. Lloyd, W. Pollard, H. E. Rubie (late Temp. Sec. Lieut., Oxf. and Bucks. L.I.), W. H. Sanderson, F. L. Tomlinson; Aug. 14th.

Sec. Lieut. D. G. Cowan resigns his commission, and is granted the hon rank. of Sec. Lieut.; Aug. 17th.

Sec. Lieut. J. F. Dick relinquishes his commission on account of ill-health, and is granted the hon. rank of Sec. Lieut.; Aug. 17th.

Sec. Lieut. G. T. Simonds resigns his commission; Aug. 17th.

The date of temp. commission granted to Capt. C. H. Frazier, M.C., is May 11th, and not as stated in *Gazette* May 28th.

The surname of Sec. Lieut. A. S. M. Low is as now described, and not as stated in *Gazette* July 19th.

The initial of Lieut. T. Parker-Jervis is as now described, and not as stated in *Gazette* Aug. 6th.

The notification in *Gazette* July 9th, concerning Sec. Lieut. F. Drake is cancelled.

The notification in *Gazette* Aug. 2nd concerning E. E. Blake is cancelled.

Technical Branch.

The following to be Temp. Lieut.-Cols. while employed as Lieut.-Cols.:—Maj. C. Defries; May 15th. Capt. (Temp. Maj.) J. E. Dixon-Spain; July 17th.

Capt. F. D. Berridge to be Temp. Maj. while employed as Maj.; July 17th.

J. F. B. Vidal, M.C. (Temp. Lieut., R.E.) is granted a temp. commission as Lieut., and to be Temp. Capt. while employed as Capt.; April 13th.

Lieuts. to be Temp. Capts. while employed as Capts.:—F. Knight; May 1st. N. Macgregor, from (O.); July 22nd. F. H. Cooke, H. S. Hollings, A. R. Langton, W. Scott, T. M. Wilson, J. Wingate; Aug. 1st.

Lieut. W. J. Reid to be Lieut. from (K.B.); Jule 15th.

Lieut. J. P. D. Maclagen to be Lieut. from (A. and S.); July 6th.

Sec. Lieuts. to be Temp. Lieuts. while employed as Lieuts.:—G. B. Fielding, G. Gilbert, C. W. Mayne, J. A. H. O'Hynes; May 1st. (Hon. Lieut.) T. H. Birdsall, C. A. Christmas, G. Dickson, W. Denfith, H. J. L. Greatwich, K. Gray, W. H. Harrison, J. E. Lamonby, R. Leedal, (Hon. Lieut.) E. P. Lyon, A. N. Meier, F. C. North, A. F. Rae, (Hon. Lieut.) F. T. Sinclair, A. B. Taylor, H. G. Toye, P. B. K. Walsh, J. G. Wright; Aug. 1st.

W. S. Allen (Temp. Lieut., R.E.) is granted a temp. commission as Sec. Lieut., and to be Hon. Lieut.; June 29th.

Lieut. H. D. Roe to be Sec. Lieut., and to be Hon. Lieut. from A. and S.; May 24th.

Sec. Lieuts. (late Gen. List, R.F.C., on prob.) are confirmed tin their rank as Sec. Lieuts.:—G. R. Rankine; April 24th. (Substituted for *Gazette* notice June 4th), F. W. Wheeler; April 29th. A. J. Kurn; May 25th. R. P. Coulter; July 4th. H. Sugden, C. H Martin; July 27th. W. Bourne; Aug. 1st.

To be Sec. Lieuts., from Admin.:—G. A. H. Wootton; June 1st. E. Hodgson; June 25th. W. E. Burden; July 1st. W. E. Garden; July 3rd. W. F. Bevis; July 10th. H. A. Read; July 13th. J. H. Pattman; July 19th. T. D. H. Bruce, W. G. Fairley; July 24th. W. Littlejohn; Aug. 1st W. Muir; Aug 6th.

The date of appointment of Sec. Lieut. A. H. Brown as Temp. Lieut., notified in *Gazette*, April 20th, is April 11th.

The date of appointment of Lieut. (Hon. Capt.) F. B. Bedford as Temp. Capt. is June 17th, and not as stated in *Gazette*, July 2nd.

Medical Branch.

H. L. H. Greer (late Capt., R.A.M.C.) is granted a temp. commission as Capt.; July 19th.

The following are granted temp. commissions as Lieuts.:—N. Homewood; July 12th. R. G. J. McCullagh, S. A. Nield-Faulkner, P. C. Parr, N. Rumboll; Aug. 14th.

Establishments.
Central Flying School.

The following temp. appointments are made:—Instructors (graded for purposes of pay as Majs.) (Flying):—Lieut. (Temp. Capt.) T. F. Hazell, M.C., *vice* Maj. R. S. Lucy; May 25th to June 25th. Capt. F. Lindsay, *vice* Capt. W. R. S. Wilberforce; June 3rd to July 14th. Capt. P. Huskinson, M.C., *vice* Maj. A. W. Keen; May 7th to June 17th. Lieut. (Temp. Capt.) C. C. Morley, *vice* Capt. P. Huskinson, M.C.; June 18th. Capt. W. E. Molesworth, M.C., *vice* Capt. T. F. Hazell, M.C.; June 26th. Lieut. (Temp. Capt.) T. E. Salt, *vice* Maj. R. H. Freeman; June 29th.

Memoranda.

Capt. A. M. Lowe to be Temp. Maj. while specially employed; April 1st.

Capt. F. W. M. Pedley to be Temp. Maj. while holding a special appointment in the Ministry of Munitions; Aug. 1st.

Hon. A. O. Crichton (Capt., Spec. List) is granted a temp. commission as Capt.; May 1st.

Lieut. A. C. Woodman to take rank and prec. as if his appointment bore date July 17th.

Lieut. A. A. Watson (Lieut., R.F.A., T.F.), relinquishes his commission on ceasing to be employed; July 31st.

Royal Flying Corps (Military Wing).

London Gazette Supplement, August 12th.

Flying Officer.—Lieut. C. T. Black, R. War. R.; March 1st, seniority, without pay or allowances prior to March 1st, from Oct. 25th, 1915.

Flying Officers (Observers).—Temp. Lieut. H. P. Roberts, attd. Suff. R., and to be transfd. to R.F.C. Gen. List; March 17th, seniority Nov. 12th, 1917.

Lieutenants, Ind. Army Res. of Off., S. L. Matthews, J. W. W. Tregale (March 1st, seniority Jan. 31st). J. B. Case (March 1st, seniority Feb. 18th).

Equipment Officer, 3rd Class.—Temp. Sec. Lieut. (on prob.) A. W. Mansfield, Gen. List, and to be confirmed in his rank (Dec. 7th, 1917).

London Gazette Supplement, August 13th.

Flying Officers (Observers).—Lieut. J. D. Barnes, Durh. L.I. (T.F.), and to be secd.; Jan. 18th, seniority Oct. 23rd, 1917. Temp. Lieut. W. Noble, D.F.C., Gen. List; Feb. 13th.

Instructor in Gunnery.—(Graded as an Equipment Officer, 1st Class):—Lieut. W. W. Moser, Bord. R., S.R., from an Asst. Instr. in Gunnery (graded as an Equipment Officer, 2nd Class), and to be Temp. Capt. whilst so employed; Feb. 1st.

Aeronautical Inspection Department.

London Gazette Supplement, August 12th

R. Thorpe to be Temp. Hon. Lieut. whilst employed as Asst. Insp. A.I.D. Oct. 1st, 1917.

New Rules for Labour Disputes.

AN amendment of the Defence of the Realm Regulations is gazetted, dealing with the settlement of labour differences under subsection (2) of section 1 of the Munitions of War Act, 1915. Under that Act differences shall be referred to one of three tribunals as stated in schedule 1 to the Act, namely (1) the committee appointed by the First Lord of the Treasury, known as the Committee on Production; or (2) a single arbitrator to be agreed upon by the parties, or in default of agreement appointed by the Board of Trade; or (3) a court of arbitration consisting of an equal number of persons representing employers and persons representing workmen, with a chairman appointed by the Board of Trade.

The new regulation (34 B) provides that where a difference has been referred under subsection (2) of section 1 of the Act, and it appears to the Minister of Labour that an award cannot be obtained, and that the production of any article essential to the successful prosecution of the war is hampered, the Minister may annul the reference and substitute a reference to a single arbitrator appointed by himself.

An award given by any such arbitrator shall be binding both on employers and employed and may be made retrospective.

If any employer or person employed thereafter acts in contravention of or fails to comply with the award, or if an employer declares, causes, or takes part in a lock-out, or a person employed takes part in a strike within the meaning of the Act, in connection with the difference so referred to a single arbitrator, he shall be guilty of a summary offence against the regulations, but a person guilty of any such offence shall not be sentenced to imprisonment.

FLIGHT

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

British.

Headquarters R.A.F., Independent Force, August 13th.

"On the night of August 12th-13th our machines attacked a hostile aerodrome and trains, anti-aircraft batteries, searchlights, and other ground targets with bombs and machine-gun fire. All our machines returned safely On the 13th the hostile aerodrome at Buhl was attacked. The results were unobserved owing to bad visibility. In the course of fighting in the air one hostile machine was brought down in flames and fell in our lines. All our machines returned safely."

General Headquarters, August 13th.

"Work in the air was actively carried on in all its branches on August 12th. On the battle front our balloons were pushed forward close behind the line and sent down much useful information. Our artillery and reconnaissance machines were busily occupied all day, enemy aeroplanes were active, and there was much air fighting. Thirty hostile machines were brought down, and seven driven down out of control. One German balloon was shot down in flames. Forty-five tons of bombs were dropped by us during the 24 hours, Péronne and Cambrai stations being heavily assailed. Twelve of our aeroplanes, including one night bombing machine, are missing."

General Headquarters, August 14th.

"Fine weather on August 13th again enabled a large amount of aerial, work to be carried out. The continuous bombing of the Somme bridges, coupled with that of railway lines and junctions, which has taken place night and day since the beginning of the offensive, has interfered with the arrival of the enemy's reinforcements. It has also forced the enemy to employ large formations of scouts to endeavour to protect his communications of such vital importance to his other arms, but concentrations of our machines have effectively dealt with all opposition. Fifty-eight tons of bombs have been dropped during the last 24 hours on the above objectives—21 by day and 37 by night. A raid was also carried out on a hostile aerodrome from a low height by British and American squadrons, which resulted in six enemy machines on the ground being destroyed and hangars set on fire. In fighting 21 enemy machines were brought down and 10 driven down out of control. Six of our machines are missing."

War Office, August 14th.

"*Palestine.*—On the morning of August 8th an extensive bombing raid was carried out by Royal Air Force and Australian units against the enemy camps and establishments in the vicinity of Amman railway station, many effective hits being observed and ground targets engaged with machine-guns."

Headquarters of the R.A.F., Independent Force, August 15th.

"On the afternoon of the 14th instant our machines successfully attacked the station and sidings at Offenburg. Direct hits were obtained on the railway. Heavy fighting took place, in which two enemy aeroplanes were destroyed and a further two enemy aeroplanes were driven down out of control. All our machines returned safely. Night operations were carried out on the 14th-15th instant against a hostile aerodrome, blast furnaces, railway sidings and various ground targets. All our machines returned safely. In addition to operations carried out on the 13th inst., an attack was made on Thionville [Lorraine]. Two hostile machines were destroyed in the course of fighting, and three of our machines failed to return. Our aeroplanes were again active during the night of the 13th-14th against aerodromes and railways. Observation was too difficult to observe results. All machines returned safely."

General Headquarters, August 15th.

"On the 14th inst. the enemy's activity in the air decreased somewhat, but our own machines carried out a great deal of reconnaissance and observation work and took many photographs. Twenty-two tons of bombs were dropped by us during the day, the principal targets attacked being Péronne, Roisel, Engel dump, and Bruges Docks. In air fighting 22 hostile machines were destroyed and six driven down out of control. Fifteen of our aeroplanes are missing. On the night of August 14th-15th the Somme bridges and the railways at Péronne, Douai, and Cambrai were heavily bombed, a total of 30 tons being dropped with good effect. An enemy night-flying aeroplane was brought down in flames. One of our night-bombing machines failed to return."

Admiralty, Aug. 16th.

"During the period August 8th to 15th, R.A.F. contingents, working with the Navy, have carried out a large number of bombing raids on military objectives with good results. In all approximately 60 tons of bombs have been dropped on Zeebrugge, Ostend, Docks, Varssenaere aerodrome, La Brugoise Works, Bruges Docks, Blankenberghe, and Middelkerke, as well as on many enemy batteries and billets. As a result of the attack on Varssenaere aerodrome, six machines lined up were set on fire, and a fire started amongst hangars on both sides of the aerodrome. Two Gotha hangars were hit and one demolished. Large petrol dumps also were set on fire. Fires were observed to be still burning three hours later. On the 11th, as previously reported, a German airship was sighted in the North Sea and attacked by one of our machines. After a short engagement the enemy airship fell in flames from a great height. Enemy shipping has also been successfully attacked, and a direct hit was observed on a hostile destroyer, after which other vessels closed round damaged ship. On the return journey, when about eight miles from the scene, a big explosion was seen to occur. During engagements that have taken place, 16 enemy machines and one captive balloon were destroyed, and 15 machines driven down out of control. Three of our machines failed to return. In home waters during the same period continuous anti-submarine, convoy, and hostile aircraft patrols have been maintained by seaplanes, aeroplanes and airships. Submarines have been sighted and attacked and mines located and destroyed. All our machines have returned."

General Headquarters, Aug. 16th.

"On August 15th the number of combats was not great. Four hostile machines were destroyed by our airmen and two German observation balloons were shot down in flames. Five hostile machines were driven down out of control. One of our aeroplanes is missing. Much reconnaissance work and a good deal of observation for artillery fire were successfully accomplished during the day. The total weight of bombs dropped by us in the course of the 24 hours amounted to 22½ tons. Two German aerodromes were heavily attacked, as well as several of the enemy's dumps and railway connections. All our night bombing machines returned safely."

"During the day of August 14th we brought down or put out of action 15 enemy machines and eight balloons, which were set on fire. Our bombarding squadrons have dropped 32 tons of projectiles in the battle zone in various regions of the back area. Many railway stations were hit, notably those of Tergnier, Noyon, Mezières, and Thionville. Lieut. Nungesser brought down four observation balloons in flames, which brings to 43 the number of machines brought down by this pilot."

Headquarters, Independent Force, R.A.F., August 17th.

"On the night of August 16th-17th our squadrons attacked four hostile aerodromes and two railway junctions. Visibility was very poor, and observation of results was difficult. In addition to the machines reported missing on the 16th inst., a third machine has failed to return."

General Headquarters, August 17th.

"On August 16th the weather continued fine, but the enemy's aerial activity was not great. Twelve hostile machines were brought down by our airmen and two driven down out of control. Six of our machines are missing. Another enemy machine was brought down during the night. The hostile aerodromes of Haubourdin and Lomme (near Lille) were heavily attacked on the mornings of the 16th and 17th respectively by a large number of our machines. Bombs were dropped from a low height, and at the former aerodrome six hangars were demolished and two machines standing in the open were destroyed. Three hangars were destroyed at the latter aerodrome, and at both places the living quarters were heavily fired on and several fires were started. Over 40 tons of bombs were dropped by us during the 24 hours."

French.

Paris, August 13th.

"During the night of August 12th-13th our bombers dropped 29 tons of projectiles on the stations and enemy establishments at Tergnier, Ham, Nesle, St. Quentin, and Noyon. Fires were observed in several places. During the day of August 12th 11 German aeroplanes were brought down or put out of action and four captive balloons were destroyed. Lieut. Madon brought down during the night of August 11th his 40th enemy machine."

"*Balkans.*—In spite of a high wind, our airmen attacked with machine-gun fire enemy organisations and working parties to the west of Ghevgeli. British airmen bombed enemy bivouacs to the north of this place."

Paris, August 14th.

"On Tuesday our air squadrons brought down or put out of action 12 German aeroplanes.

"During the night of the 13th-14th our bombing machines dropped 32 tons of projectiles on enemy objectives at Tergnier, St. Quentin, Ham, Nesle, and Noyon. The bivouacs in the region of Ognolles and the railway stations of Maisonbleue, Guignicourt, and Le Chatelet-sur-Rétourne were heavily bombarded. Violent fires broke out, especially at Ham and at Noyon, upon which places 15 tons of projectiles were dropped."

"*Balkans.*—Our air service bombarded the artillery encampments to the north-east of Monastir. Considerable losses were inflicted on the enemy. The British air service bombarded encampments north-west of Ghevgeli."

Paris, August 16th.

"Yesterday our pilots brought down or disabled 23 enemy aeroplanes. During last night our bombing squadrons carried out numerous expeditions in the zone behind the battlefield. They dropped over 14 tons of projectiles on the stations of Nesles and St. Quentin and the bivouacs of Champien and Guiscard, where several fires were observed. Other expeditions in the Aisne Valley and in the eastern region were followed by excellent results. Four tons of explosives, in particular, were dropped on the stations of Thionville and the region of Mézières-Charleville. Altogether 25½ tons of projectiles were employed."

"*Balkans.*—In spite of bad weather British aircraft bombed enemy organisations and concentrations in the Valley of the Struma."

Paris, August 17th.

"Yesterday 12 German aeroplanes were brought down or driven down out of control. During the night of August 16th-17th our bombing squadrons dropped 15 tons of projectiles in the battle zone, where numerous fires were observed, as well as on the bivouacs, cantonments and stations in the region of Pontavert and Bazancourt."

U.S.A.

Paris, August 13th.

"On August 11th and 12th our airmen successfully bombed the railroad yards at Longuyon, Dommary, Baroncourt, and Conflans. All our machines returned."

Italian.

Rome, August 13th.

"Aeroplane and airships of the Army and Royal Navy bombed hostile aviation camps and railway establishments. Two enemy machines were brought down in air fighting."

Rome, August 14th.

"Aerial activity was intense. The hutments, magazines, and railway establishments of Fucine and of Cusiano, in Val di Sole (Tonale) were effectively bombed by our machines."

Rome, August 15th.

"On the morning of August 10th British aircraft bombarded the railway at Durazzo, causing fires which were visible at a distance of 35 kilometres. All returned to their base undamaged.

"During the night of August 13th (? August 12th) naval aircraft carried out successful raids on the enemy's rearward lines beyond the Lower Piave.

"On the morning of August 13th enemy aircraft in vain attempted resistance against our usual aerial activity in the Upper Adriatic, and one of the enemy's machines was brought down by our seaplanes."

"Our own and Allied aeroplanes during the day and airships during the night bombed military objectives in the enemy's lines of communication. A hostile aeroplane and a captive balloon were brought down."

Rome, August 16th.

"Four hostile aeroplanes and a captive balloon were brought down in air fighting."

Rome, August 17th.

"During the nights of the 15th-16th and 16th-17th our Army and Naval airships bombarded with success military objectives in the rear areas of the enemy. Two hostile aeroplanes were brought down."

German.

Berlin, August 13th.

"Yesterday 29 enemy aeroplanes were shot down. Lieut. Udet won his 53rd, Capt. Berthold his 43rd and 44th, Lieut. Baron von Richthofen his 39th and 40th, Lieut. Koenneke his 29th, Sergt. Thom his 28th, Lieut. Laumann his 24th, 1st Lieut. Baron von Boenigk his 21st, and Sergts. Doerr and Mai their 20th aerial victories."

Berlin, August 14th.

"Lieut. Bole obtained his 30th, 1st Lieut. Loeger his 29th, and Lieut. Roeth his 20th aerial victory."

Berlin, August 15th.

"A British bombing squadron, which was on its way to make a raid on home territory, was engaged by our chasing forces before it reached its objective, and was forced to return after the loss of five aeroplanes."

"Yesterday 24 enemy aeroplanes and one captive balloon was shot down."

Berlin, August 16th.

"Yesterday we shot down 24 enemy aeroplanes. Lieutenant Udet achieved his 54th and 55th, First Lieutenants Koenneke and Loerzer their 30th, Lieutenant Neckel his 22nd and 23rd, and Lieutenant Seth his 21st aerial victories."

Berlin, August 17th.

"There was lively aerial activity over the battlefield. Lieut. Udet gained his 56th aerial victory.

"Our chaser planes shot down four large English battle-planes which attacked Darmstadt with bombs."

Turkish.

Constantinople, August 12th.

"One of our aerial squadrons dropped 150 bombs on an enemy encampment at Tafile to the west of Maan."

Constantinople, August 13th.

"On the Palestine front there was a good deal of aerial activity."

"There were isolated artillery combats and great activity. Our airmen dropped numerous bombs on enemy encampments south of Tafile and good results were observed."

LEISURE HOURS.

NEARLY 900 employees of the Grahame-White Company, assembling in the new Mess Room on the evening of August 14th, witnessed an excellent boxing tournament which had been arranged under the auspices of the Grahame-White Recreation Association.

The most interesting contest was between Wally Trainer (Forest Gate) and Alf Green (Finsbury). It was only by a very small margin, and after ten capitally-fought rounds, that Trainer gained a decision.

Other contests were as follows:—Six rounds—E. Owen (Whiteheads) beat H. Thick (Grahame-White); Ten rounds—Sergt. Jarvis (A.S.C.) beat Jack Levine; Nine-stone competition (final)—J. Handscombe beat Jack Pine; Eight-stone competition (final)—H. G. Berrard beat A. Melton. Incidental displays were given by the veterans Jack Collinson and Billy Ross; the Spiers Midgets; and Billy Tucker, the well-known ball-puncher. Mr. Grahame-White and Mr. H. W. Keen (*Sporting Life*) acted as referees. The judge was Mr. S. B. Riley; the timekeeper Mr. H. Holmes (ex-lightweight champion of Great Britain); and the M.C. Mr. W. Goy. So much interest is now being taken in the boxing section of the G.W.R.A. that it is hoped to arrange a tournament every month.

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MAINLY with the idea of providing amusement for some 350 wounded soldiers who were the guests of the employees of the British and Colonial Aeroplane Co., Ltd., for the afternoon, the Entertainments Committee, of which Mr. H. J. Thomas, the works manager, is chairman, arranged a sports carnival on August 10th at the Zoological Gardens, Clifton. Among the items a series of pillow fights over water, including one in which two ladies took part, provoked a good deal of laughter. The tug-of-war items testified to the healthy rivalry between the various departments, "Saw Mills" being the winners for the men, and "Trimming Dept. A" for the women. The winners in the various events were:—Obstacle race, Miss Emery; sack race, B. Dyer; veterans' race, J. Watts; thread-needle race, Miss M. Rhoades; pillow fight, (women) Miss Caie, (men) N. Austin. Tea was thoughtfully provided for the guests, and a selection of music was played by the company's orchestra, under the direction of Mr. A. Pratt, while the Male Voice Choir, conducted by Mr. H. Livesey, were loudly applauded for their vocal items. Somewhat of a surprise was a performance by the "Bristol" Pierrot Concert Party, who made a most creditable first performance. Altogether the talent shown was a credit to the works, and speaks well for the enthusiasm of those employees who provided such a fine entertainment. They hope to do a great deal more during the coming winter to brighten the lives of our wounded soldiers. Unfortunately neither Mr. Samuel White, J.P., chairman of the British and Colonial Aeroplane Co., Ltd., nor Sir Stanley White, Bart., could be present, and the prizes were distributed by Mr. E. Temple Robins.

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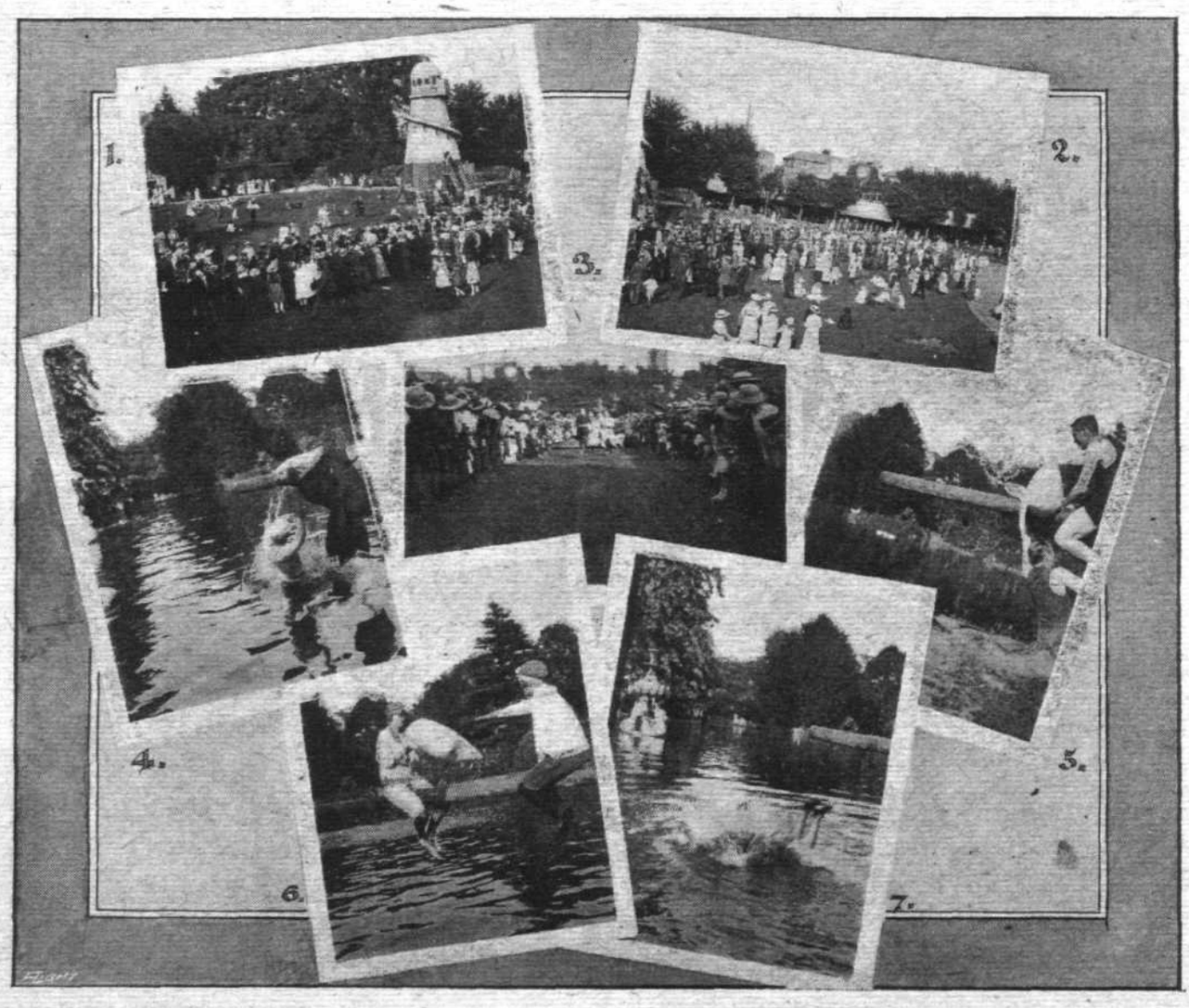
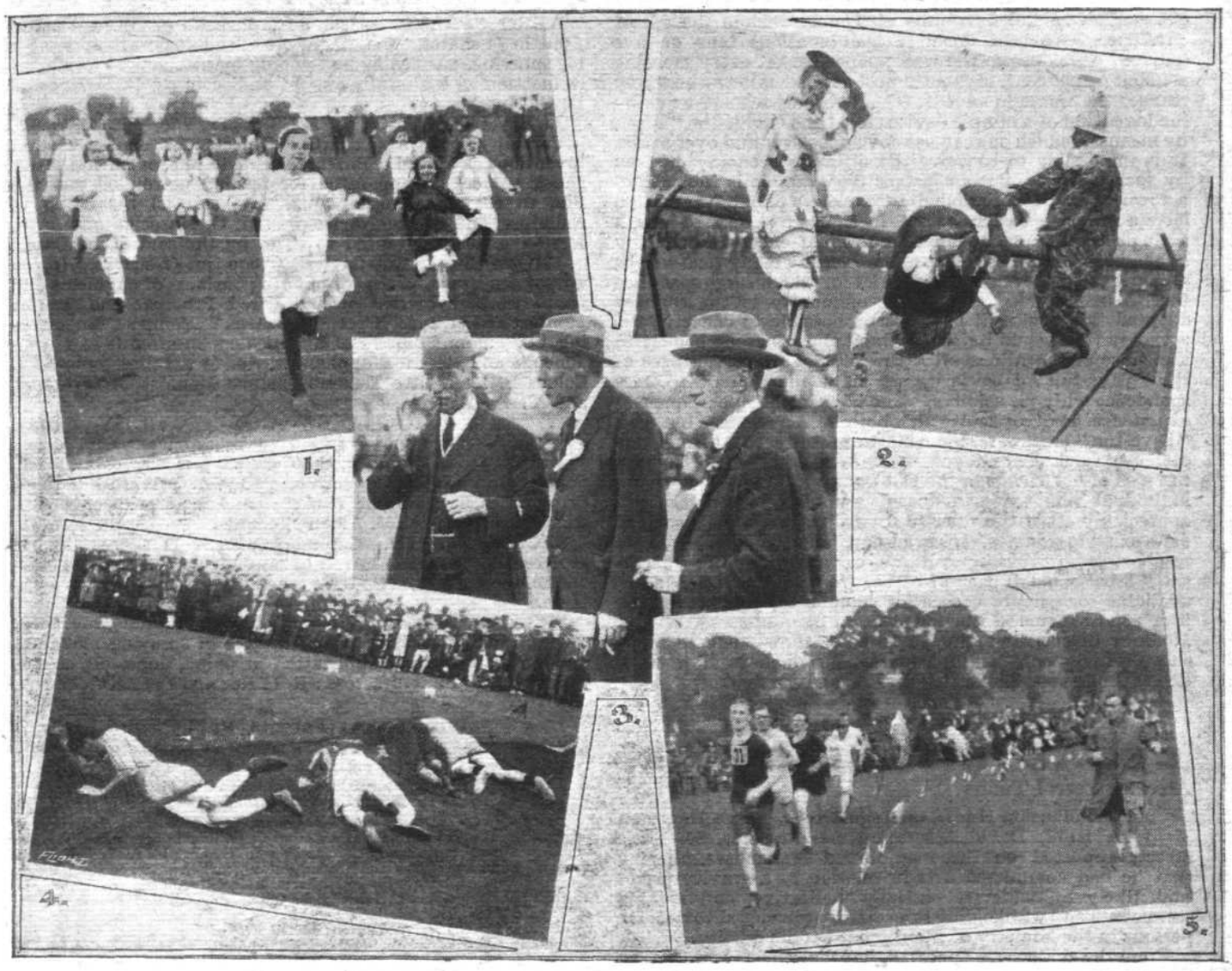
THOSE who appreciate a good game of cricket should note that a match will be played at Lord's on Saturday, August 31st, in aid of the Chevrons Club—the home and club of the petty officers and non-commissioned officers of the Navy, Army, and Air Force, and Oversea Forces. The teams, which will be captained by Lieut.-Colonel the Hon. F. S. Jackson, M.P., and Capt. P. F. Warner, will be chosen from the following well-known English and Dominion cricketers:—Comdr. C. B. Fry, Maj. E. P. Barbour, Lieut. C. T. Docker, Sergt.-Instr. E. C. Kirk, Sergt.-Maj. H. T. W. Hardinge, Lieut. D. J. Knight, Air-Mech. J. B. Hobbs, Pte. E. Hendren, Lieut. P. G. H. Fender, Lieut. H. W. Taylor, Capt. W. B. Franklin, Capt. B. G. Mellé, Maj. the Hon. L. H. Tennyson,



BRITISH AND COLONIAL AEROPLANE CO.'S CARNIVAL AT CLIFTON.—(1 and 2) General views in the Zoological Gardens, where the carnival was held; (3) A race up the straight; (4 and 5) The men's methods in the "pillow fight"; (6) The tactics of the gentler sex in the same event; and (7) The loser.



BRITISH CAUDRON CLUB'S SPORTS, AUGUST 17th.—(1) Children's (girls') race, finish; (2) The comical costume men have a turn on the pole; (3) Three prominent officials: Col. Pinkham, Messrs. A. M. Ramsey and H. R. Simkins; (4) Queer fish in the obstacle race; (5) Last lap of the 880 yards open handicap.

F. R. Woolley, J. W. Hearne, G. T. S. Stevens, C. H. Gibson, Capt. W. H. Heath, the Rev. F. H. Gillingham, Lieut.-Col. J. W. H. T. Douglas, and Capt. N. Haig.

Play will begin at 11.30 a.m., luncheon will be at 1.30, and stumps will be drawn at 7 p.m. (or 7.30 if there is a chance of a definite result). There will be no tea interval. Tickets, from 1s. to 5s., can be obtained at Lord's, or from the Chevrons Club, 74, St. George's Square, S.W.

SOME excellent performances were made at the sports of No. 2 and No. 4 Stores Depôt of the R.A.F. at Stamford Bridge on Saturday last. A 100 yards race for officers was won by Capt. C. Rayner, with Maj. Langdon second, and the 100 yards R.A.F. handicap fell to Lieut. F. C. Phillips, 3 yards start, in 10 1-5 sec. Other winners were:—Quarter mile: Cadet R. R. M. Henry, 14 yards start, 52 3-5 sec. One mile handicap: Flight-Sergt. H. Darlington (Central Flying School), 50 yards start, time 4 min. 34 4-5 sec. One mile relay race: Central Flying School, time 4 min. 1 2-5 sec. One mile relay race (closed), No. 2 Section, 4 min. 15 3-5 sec. "Closed" ½-mile handicap, Sergt. Carter (No. 2), scratch, in 53 3-5 sec. Corpl. Price (No. 4) won the cricket ball-throwing competition at 104 yards 2 feet.

THE second annual sports of the Royal Aircraft Establishment were also held last Saturday, and the 45 items on the programme kept everyone fully occupied during the afternoon, from the start at 2 o'clock until the presentation of the prizes in the evening by Mrs. W. Sidney Smith. Some of the chief results were 100 yards open handicap, Corpl. T. Garnett (8½ yards), 10 5-10 sec.; ½ mile handicap, G. Elvidge; 220 yards open, Corpl. T. Garnett (15 yards), 29 4-10 sec.; long jump, W. C. Warn, 14 ft. 4 in.; 880 yards open, A B A. J. Pitcher, R.N.V.R.; high jump, W. C. Warn, 4 ft. 10 in.; officers' obstacle race, Sub-Lieut. E. Worsley, R.N.V.R., 7 miles; Marathon, H. E. Reeves, 43 min. 50 2-3 sec. (This made Reeves' second win.) The Millwrights won both the tug-of-war and the pillow fight; in the latter event the pole broke and the captains fought it out. For the second time E. West won the 100 yards R.A.E. Championship. In the 1 mile open handicap the winner was Sub-Lieut. D. J. Brown (105 yards) in 4 min. 44 4-10 sec.

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SIDE-WINDS.

THE Pulvo Engineering Co., 10, Dane Street, High Holborn, have had to apply for additional telephone facilities owing to the growth of their business. Their numbers now are Holborn 409 and 410.

WE understand that some correspondence intended for the Sceptre Aviation Co., Ltd., is still being addressed to the Super Aviation Co., Ltd. We are asked to again remind those concerned that the firm now trading under the name of the Sceptre Aviation Co., Ltd., recently changed its style from the Super Aviation Co., Ltd., to avoid confusion with another firm of a similar title.

The directorate and management remain unchanged and both the liabilities and assets remain the property of the same firm, whose constitution remains unaltered save for the actual change in name.

IN spite of appeals by poster and other means it is doubtful

whether many people realise their own power of helping on the war. One fruitful source of economy lies in the use of envelopes. When a business man consigns four or five hundred envelopes to the waste-paper basket every morning —about 95 per cent. of them almost as good as new—he rarely realises the waste involved. This is brought home to us by the invention of a simple device called the "Save-tun" label, by means of which one can use envelopes over and over again. It is impossible to conceive the ultimate economy effected by such a device, but an instructive example is the case of a town of say, 800,000 inhabitants where about two million letters are posted each week. In the course of a 12-month a single town of such dimensions would effect an economy of about 80 million envelopes, representing many tons weight of paper and paper-making material for which cargo space has had to be provided. If every community in the country adopted this device, it is almost impossible to conceive the economy that would be effected and the resultant benefit to the cause of the Allies. Not the least of the advantages of the "Save-tun" label is its use in connection with correspondence with our soldiers. The boys in the line frequently experience great difficulty in obtaining envelopes, but if a "Save-tun" label were slipped into each letter to the front, this difficulty would be removed, to the delight not only of Tommy but also of his friends in the Old Country. Even the private individual who writes a dozen or so letters a week, can appreciably assist the country towards a successful issue out of its existing troubles. Kenrick and Jefferson, Ltd.—who are responsible for this innovation—are providing the "Save-tun" label in small packets of 150 (1s.), so that it is equally available for private use as for commercial purposes. The firm's show-rooms in London are 22, St. Andrew Street (off Holborn Circus), but they also have show-rooms at Manchester, Liverpool, Cardiff, Swansea, Birmingham, Newcastle, Leeds, Leicester, Sheffield, Glasgow and Belfast.

LEGAL INTELLIGENCE.

Aircraft Petrol Tanks.

AT the Mansion House, on August 19th, before Alderman Sir John Knill, David Assersohn, metal-worker, St. Bride Street, appeared on three adjourned summonses, alleging that he had committed acts in relation to a gravity petrol tank likely to render it partially ineffective, and making statements and withholding information calculated to deceive persons in the Ministry of Munitions as to its quality.

From the evidence it appeared that the defendant was given a sub-contract by Savages, Ltd., for the supply of gravity petrol tanks for aeroplanes. From the Government's specifications, he made a specimen tank, but it was rejected as being double-grooved, and not riveted. Later on the defendant presented a number of tanks, which were accepted, with one exception. This one was identified as that originally rejected. Rivets appeared to have been put in, but they were "blind rivets," and they fell out when a soldering-iron was applied.

For the defence it was submitted that no offence had been committed, as the tank had never been supplied. Of the tanks submitted, all but this particular one passed the Government inspectors. The specifications had been altered and varied since the contract was entered into, and the tank in question was one of those originally submitted.

Witnesses were called, including the defendant, who testified that gravity tanks were stronger and more efficient when double-grooved and sweated than when riveted. Major Parnell-Smith, Lieut. Raven, and Lieut. Gough, of the Aeronautical Inspection Directorate, spoke to the excellent quality and accuracy of the defendant's work.

Sir John Knill said that the defendant would have to pay £100, with £21 costs, on each of the three summonses—£363 in all. The prosecution was a very proper one.

It was stated that the defendant would appeal to the High Court on a point of law and to the Quarter Sessions on the facts.

PUBLICATIONS RECEIVED.

The National Physical Laboratory: Report for the Year 1917–18. Teddington: The National Physical Laboratory. Price 2s. 6d. net.

Trade Parliaments and Their Work. By Ernest J. P. Benn. London: Nisbet and Co., Ltd., 22, Berners Street, W.1. Price 1s. net.

Aeroplane Construction and Operation. By John B. Rathbun. Stanton and Van Vliet Co., 501, Plymouth Court, Chicago, Ill., U.S.A.

NEW COMPANIES REGISTERED.

AERO SPRAYS, LTD., 175, Piccadilly, W.1.—Capital £500, in £1 shares. Manufacturers of and dealers in apparatus for spraying, varnishing and doping by mechanical means, in connection with aircraft, &c. First directors: R. P. Roe and D. C. Hutchinson.

L. B. AUTOMATIC DEVICES, LTD., 166, Piccadilly, W. —Capital £1,000, in £1 shares. Objects: To exploit certain inventions of Leon Le Bozec, relating to improvements in (*a*) check valves, (*b*) apparatus for feeding petrol, oil and the like to engines or other apparatus, and (*c*) the filling of radiators, and to acquire from P. M. G. Marechal and F. C. Nestler a licence granted to them by the said L. Le Bozec.

PROMPER, LTD.—Capital £5,000, in £1 shares. (1,500 10 per cent. cum. pref.). Acquiring business of engineers and metal workers carried on by Alfred Promper and Jeanne Monfort at 15a, Ives Street, Chelsea, as "Prompers' Engineering Co." manufacturers of and dealers in aircraft and components and electrical appliances, &c. First directors: R. J. Coley, B. Le Maitre Mellows, Jeanne Monfort, A. Promper and T. H. Wurr.

W. ALBAN RICHARDS AND CO., LTD.—Capital £262,500, in 250,000 cumulative preference participating shares of £1 each and 250,000 ordinary shares of 1s. each. Constructors and controllers of public or private buildings, aerodromes, hangars, sheds, aircraft and accessories, engineers, &c. First director, W. Alban Richards.

SECURIAM, LTD.—Capital £6,000, in £1 shares. (2,000 preference.) Manufacturers of and dealers in paints, varnishes, dopes, &c. Under agreement with J. H. Whyte-Hille.

SPRAYS, LTD., 175, Piccadilly, W.1.—Capital £100, in £1 shares. Manufacturers of and dealers in spraying machines and apparatus for the application of paint, dope, oil, colour, varnish, &c. First directors: R. P. Roe and D. C. Hutchinson.

Aeronautical Patents Published.

Abbreviations:—cyl. = cylinder; I.C. = internal combustion; m. = motors.

Applied for in 1917.

The numbers in brackets are those under which the Specifications will be printed and abridged, &c.

Published August 22nd, 1918.

6,015. H. E. JULYAN and E. C. WEILBACH. Illuminating mariners', aeroplane and military compass cards. (117,641.)

10,564. H. C. DICKSON. Tubes, struts, stays, &c., also applicable to wings, planes, tail, body, &c., of aerial craft. (117,663.)

10,790. A. H. WILLIAMS. I.C. engines specially applicable for aero engines (117,684).

Applied for in 1918.

The numbers in brackets are those under which the specifications will be printed and abridged, &c.

Published August 22nd, 1918.

1,294. T. E. C. WILSON. Flying-machines. (117,776.)

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If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages lv, lvi, lvii and lviii).

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